The Business Journal of Vegetation Management December 1979/$1.25

WEEDS TREES & TURF

Master Street Tree Planning

How to Manage Pruning Operations

Engine Selection for Pump Systems

Buckeye or Horse Chestnut in Illinois

ISSN 0043-1753

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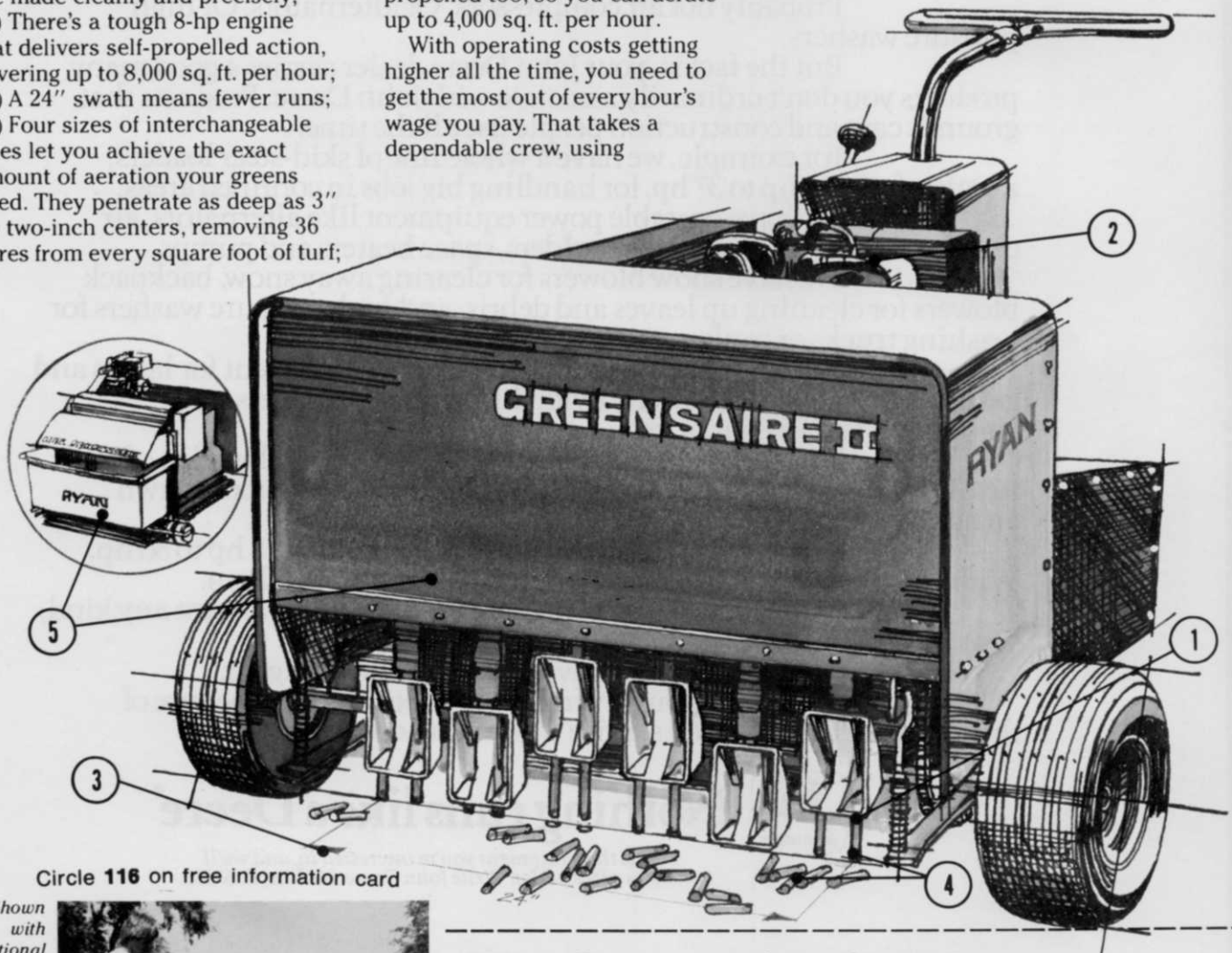

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CONTENTS

DECEMBER 1979/VOL. 18, NO. 12

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Golf Editor
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Viewpoint 6

Landscape Contractor News 12

Government Update 14

GREEN INDUSTRY NEWS

Staff Changes: GCSAA Executive Director Sheetz Resigns . . . Illinois' Turgeon Hired By Texas . . . Illinois' Street Hired By Ohio State University . . . Golf Course Superintendent Recertification Seminars to Precede Annual Show. 11

FEATURES

Implementing Street Tree Inventory and Planning Systems

Computerization of tree programs in communities is becoming a necessity rather than a luxury. Park and Tree Superintendent and landscape architect Leonard Phillips of Wellesley, MA, tells how to set up an inventory and then plan for a Master Street Tree Program on computer. 18

INDEX OF WEEDS TREES & TURF ARTICLES FOR 1979

A convenient four-page pull-out section for reference libraries. Author and subject listings are alphabetized for easy location. Perfect for an introduction to a WTT Binder. 25

Engine Selection for Pump Systems

Engineers from five manufacturers of spraying units tell the important considerations when replacing an engine in a pump system. Engine characteristics are covered in this comprehensive article. 29

Labor, Pace of Technology Will Change Standards in the 80's

An experiment in forecasting the future to anticipate business trends in the next decade. Read it and then construct your own version to the future. 32

Managing Pruning Schedules and Crews

Grounds Superintendent for The University of Houston Harleigh Kemmerer describes the complexities of a task normally considered a time filler. 35

Vegetation Management 38

Products 41

Classifieds 46

Events 48

Cover: Grover Brinkman of Okawville, IL, took this photograph of the tough relative of the chestnut, the Buckeye. Grover says the tree is an all year conversation piece first with blooming, nut pods, and finally a brilliant yellow foliage in the fall.

VIEWPOINT

by Bruce F. Shank, Editor

This magazine has a very obligating name, Weeds Trees & Turf. If we get too light on any one area for more than a month, I get letters suggesting that the name should be changed. We have committed fraud in their opinion when we call the magazine Weeds Trees & Turf and then don't have something on each subject area every month.

I get criticism from former editors, long-time readers, and die hard specialists. There is little time to rest on our laurels when our watchdogs pay such close attention to the magazine.

So, in this time of thanksgiving and reflection, I'd like to thank our critics. Their criticism is what keeps the magazine comprehensive and informative. Every letter is considered for its remarks and kept on file for action. In 1980, these remarks will be reflected in article topics and new monthly features. Once again, thank you dear critics for keeping me on my toes to provide you with your money's worth.

Student subscription program

College students are a transient bunch, driving our computers nuts with address changes. Nevertheless, we want to make sure they receive the magazine on a monthly basis.

Therefore, for the 1980/81 school year we are offering a student subscription program. We offer the following: half price rate for each student in Green Industry classes, complimentary subscription to the instructor, magazines will be distributed by the instructor the first week of each month.

Seniors especially should subscribe for the job listings and news of employment trends. We will extend the student rate for one year after graduation.

We encourage instructors of technical and four-year programs to write for more details. In fact, if there are areas which you would like us to research and feature in the magazine, please let me know. Or, if you have research findings you would like to publish let me know.

As I have told other professors, if a student project reveals important trends or events in the Green Industry, we'd like to publish the work.

Seasons greetings and best wishes

The staff of all the Harvest Business Publications magazines want to wish you and your family a Merry Christmas and a Happy New Year.

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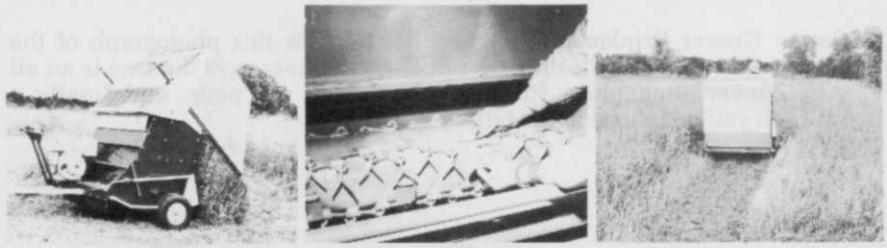

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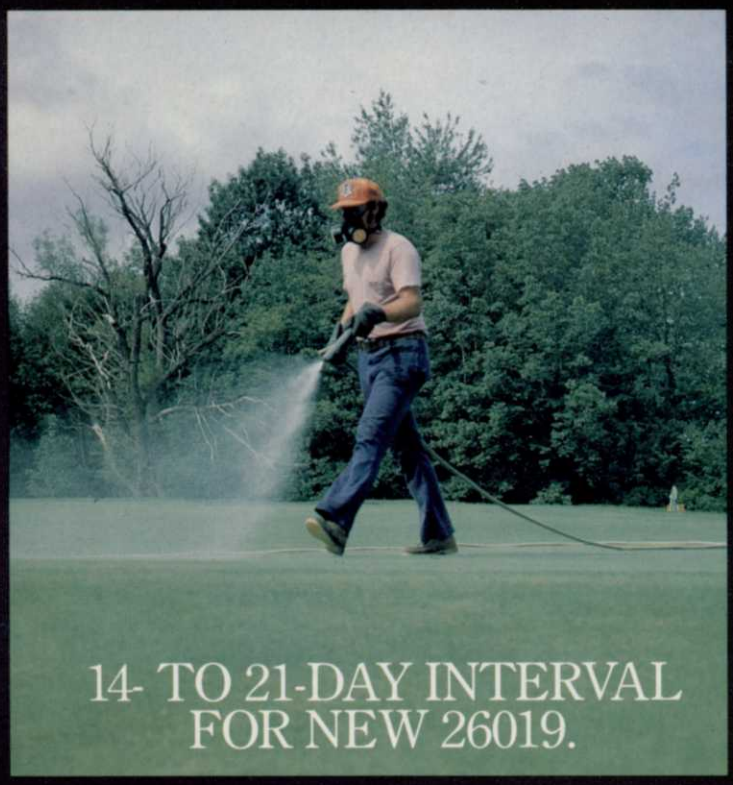

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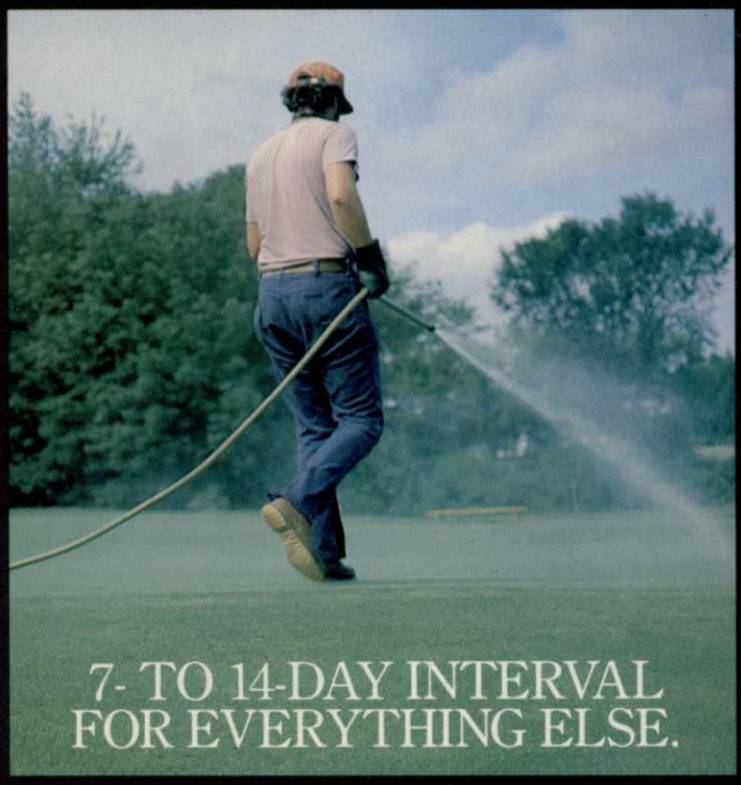

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Here's a new fungicide that could change your whole way of thinking about broad-spectrum fungus control *and* spray intervals. Because new Chipco 26019 gives more control with fewer sprays than any of the old fungicides you've had to use.

It stops the major turf diseases—dollar spot (including benomyl-resistant dollar spot), brown patch and Helminthosporium (leaf spot). And it does it for up to three weeks, at low, economical rates.

It's a nice material to handle, too. It mixes well, with no residual left in the tank. It also presents no problems of phytotoxicity to turf.

Last year was a wet one, with unusually high disease pressure in most areas. Yet, Chipco 26019 performed beautifully in wide-spread tests. This year, you'll have the chance to see how well it can perform for you. So ask your chemicals distributor for this welcome addition to the popular Chipco

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"The main reason I'll use Chipco 26019 is to control dollar spot. Picking up brown patch and the others is gravy, as far as I'm concerned. This is a real good new chemical."

—Bob Dickison, golf course superintendent
Upper Montclair Country Club, Clifton, N.J.

"I feel very good about this product. We tested it during one of the roughest summers in my memory. I think, over a 14-day period in August, we had very close to 10 inches of rain. It was an acid test for the material. These chemicals come and go, and some of them are short-lived. But you folks have something good here. The sprayability of Chipco 26019 is very impressive. And you only need six to 10 hours of drying time, which helps a lot during rainy periods. Some other materials require at least 12 hours."

—Paul Boizelle, golf course superintendent,
and John Fenwick, foreman,
Fiddler's Elbow Country Club, Far Hills, N.J.

"We started using Chipco 26019 in June of 1977. Before we started using it, we had very little luck with our other contact and systemic fungicides in certain areas. We were applying some contact fungicides at preventative and curative rates, and still only getting two or three days control, with the usual cold fronts coming through, followed by large outbreaks of dollar spot. Since we started using Chipco 26019, we haven't found dollar spots in these areas at all."

—Randy Wahler, golf course superintendent
Glen Flora Golf Course, Waukegan, Ill.

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GREEN INDUSTRY NEWS

Major staff changes shock turf world

Three major turf figures changed positions in November, a topic which became the talk of many regional turf shows.

The biggest change was the resignation of Golf Course Superintendents Association of America Executive Director Conrad Scheetz. GCSAA has made no official announcement of the situation. Education Director Palmer Maples is acting executive director until the Executive Board makes a decision on the replacement of Scheetz.

The change means two major GCSAA positions are unfilled, the other being the Director of Communications.

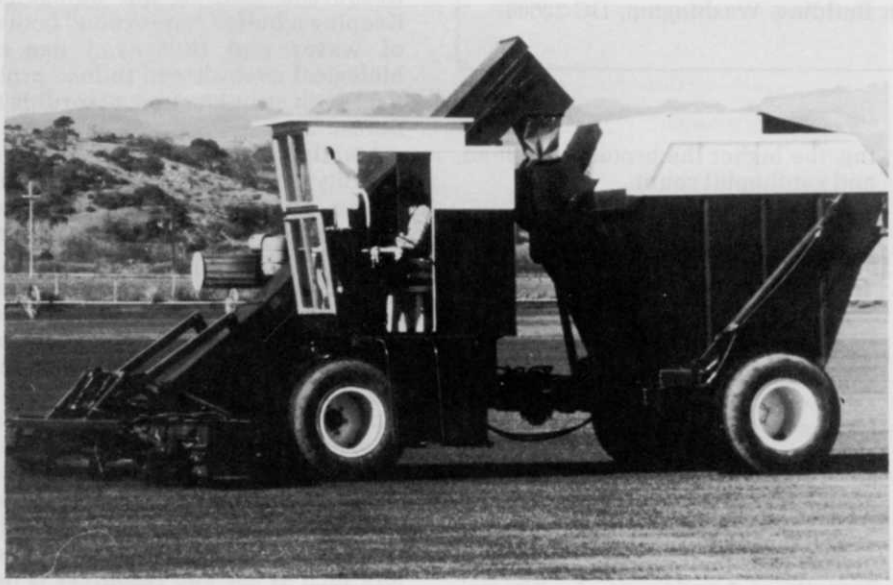
The University of Illinois suffered two blows to its turf program by the departure of Dr. Al Turgeon to Texas A & M and Dr. John Street to Ohio State University.

Dr. Turgeon will be promoted to a full professor and will direct the Texas A & M Research and Extension Center in Dallas.

Dr. Street will be promoted to associate professor of turfgrass at Ohio State University's Columbus campus.

The moves take the University of Illinois from a leading position in turf research to a questionable one. Ohio State University recently lost Dr. David Martin to Chem Lawn Corp.

New turf field lab at Michigan State University is now under construction after this ground breaking ceremony in October. The new Hancock Turf Field Lab will centralize all turf research plots at MSU while providing office space. Taking part in the ground breaking are (left to right): Dr. Paul Rieke, Dr. Ken Payne, Dr. Dale Harpstead, Dr. John Kaufmann, and Dr. Joe Vargas.



Custom-designed sod mower is used by Warren's Suisun City, CA, turf farm to process bluegrass clippings for animal feed.

TURF

Sod grower makes feed of dehydrated clippings

Warren's Turf Nursery, Inc. has discovered dehydrated grass clippings to be a valuable agricultural product used for poultry, cattle, and horse feed and plans to expand production.

After experiments with the USDA and the University of California a few years ago, Warren constructed a pilot plant for dehydrating grass clippings. The clippings are converted into dehydrated pellets which sell for $150 to $200 a ton. One acre of grass yields four to six tons of dried pelletized clippings a year.

Warren enlarged the pilot plant in California and built a second plant at its Wisconsin nursery. It now has plans to construct dehydration plants at Plymouth, OH; Anderson, IN; Middletown, NJ; and near Chicago.

The actual value of dehydrated clippings is about twice the value of dehydrated alfalfa because of the higher content of protein, caratene, and xanthophil. Xanthophil is of

Landscape Contractor News

Conference to discuss energy saving

"The Energy Efficient Landscape" is the theme of the 1980 Environmental Horticulture Conference to be held in Goodman's Hall, Jack London Square, Oakland, CA, on Feb. 13.

The conference should help landscape architects, contractors, nurserymen, arborists, professional gardeners, and park and recreation managers save energy through successful planning and practices of landscape maintenance. Topics include use of waste water in landscapes, energy efficient plants from Australia, and energy wastes.

The University of California Cooperative Extension and 13 societies and associations connected with landscape horticulture will sponsor the event. The fee for the 1980 conference is $10 for preregistration and $13 at the door. Make checks payable to Environmental Horticulture Conference and mail to: 2033 White Oak Way, San Carlos, CA 94070.

Clinic will stress high yield for 80's

The 1980 Landscape/Garden Center Management Clinic, entitled "High Yield Management for the '80's," will be held Feb. 10-13 at the Galt House, Louisville. KY.

The National Landscape Association and the Garden Centers of America will sponsor the event. The program, as always, is geared to top and middle management of landscape and retail nursery firms.

One substantive change in this year's approach is having the first days of the clinic devoted to garden center topics. The middle days will deal with topics of mutual interest and the end of the clinic will deal with landscape subjects. Traditionally, landscape subjects have been first.

"The change this year is due to the Valentine holiday and the fact that many garden centers have floral operations," says NLA President Frank Tomlinson. "Having retail topics covered first allows those managers to return in time for the increased business period surrounding that holiday."

Among the subjects to be covered during the landscape portion are: "Planning and Managing Successful Landscape Maintenance Services," "Soaring Through the 80's," "The Future in Design/Plant-/Build," and "Financial Management." Advance registration for the total program is $70 and may be sent to: Landscape/Garden Center Management Clinic, 230 Southern Building, Washington, DC 20005. Deadline is February 1, 1980.

special value to the poultry industry because it is the chemical or coloring agent that gives the skin of dressed poultry a yellowish color rather than a whitish tinge.

Warren learned that the value of the finished product is greater when the clippings are not allowed to touch the ground and are caught in large containers as they are mowed. Its California nursery developed a mowing machine that could cut a swath of grass 21 feet wide and convey the clippings into a large hopper from which the clippings were taken every few minutes and rushed to the dehydrator. The sooner the clippings were dehydrated after mowing, the higher the protein, caratene, and xanthophil count.

LANDSCAPE

ASLA annual meeting sets record attendance

The largest gathering of landscape architects in the history of the profession assembled in New Orleans in November to discuss and debate the impact money, law, and politics has on this design profession.

More than 1,800 landscape architects attended the American Society of Landscape Architects' 79th annual meeting to witness a number of educational sessions and a large educational exhibit.

The society installed Robert L. Woerner, a Spokane, WA, landscape architect, as its president for a one-year term.

Calvin T. Bishop of Houston, TX, and Darwina L. Neal of Washington, DC, were installed as new vice presidents, and Joseph Y. Yamada of San Diego, CA, was installed as treasurer of the society. Neal and Yamada will each serve two-year terms.

PARKS

Low maintenance trees suggested for parks

Low maintenance trees, pond management, personnel appraisal, and integrated pest management were among the topics discussed at the Ninth National Institute on Park and Grounds Management in Nashville, Oct. 28-Nov. 2.

American Garden's William Collins said trees should be selected for natural shape, climatic zone, hardiness and resistance to insects, disease and other stresses. "What we need to do," Collins said, "is to improve the rootzone by proper drainage and planting to permit the tree to express its inherited low maintenance characterisitics."

Reducing runoff of fertilizers and clippings into lakes and proper aeration should be combined into a continuous program of lake management, Stephen Belzner of Rodale Resources said to the delegates. Keeping a buffer zone around bodies of water and increased use of biological controls can reduce problems with atrophication, according to Belzner.

Meeting objectives and not personality should be the main factor in judging an employee's performance, Steve Davis, director of Clay County park department in Smithville, MO, told fellow park managers. A regular performance appraisal can boost morale and lets the worker know exactly where he stands, Davis said. Objectives should be set in measurable, definable terms at least once every quarter.

William and Helga Olkowski gave a step by step approach to integrated pest management. A look at problems, weather conditions, plus factors such as use and resources is the first step. Secondly, the manager must decide on an acceptable injury

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add any of the Turf-Truckster's accessory pieces, thanks to Cushman's pin-disconnect system. No bolting, no hitching. Just snap two or three pull pins in place and you're ready to hit the turf.

If a good transportation/hauling vehicle is all you need, though, look at the Cushman Runabouts. There's an 18-hp two-seater, and a fuel-stingy 12-hp one-seater model. Both Runabouts are economical to own. And like any Cushman vehicle, they're built tough.

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GOVERNMENT UPDATE

Federal agencies question Surflan

Officials of the Environmental Protection Agency, the Occupational Safety and Health Administration, and the National Institute for Occupational Safety and Health have launched an investigation into the herbicide "oryzalin", which they think may be responsible for heart-related birth defects among children fathered by workers who manufactured the substance.

Oryzalin, approved in 1975, is a liquid herbicide used to control weeds and brush in soybeans and cotton, certain fruits and nuts, and woody ornamental plants. The Elanco Products Div. of Eli Lilly & Co. of Indianapolis, IN, holds the registration for the compound under the brand name "Surflan."

EPA Assistant Administrator Steven D. Jellinek stressed that his office has no record of the herbicide causing health problems among users. The Agency has reviewed studies conducted by Eli Lilly & Co. to support registration of the compound, as required by the Federal pesticide law.

Sharp drop in nonwhite farm workers

Between 1965-67 and 1975-77, the number of hired farm workers in the US declined 9.3 percent — from just under 3 million to slightly more than 2.7 million, according to agricultural extension specialists at North Carolina State University.

Although the number of white workers actually increased slightly, the number of blacks and others dropped from 822,000 to 440,000. Figures show the average age of farm workers declined, resulting primarily from more workers 18 to 24 years old and less workers 45 years and older.

Survey identifies urban tree problems

Construction damage, Dutch elm disease, pine bark beetles, scale insects, and oak decline kill more city trees than anything else, according to a survey of 17 southern states. The University of Georgia's Dept. of Entomology polled more than 1,700 practicing urban foresters, university professors, arborists, and others. The survey asked them to identify the most difficult problems in their locations to determine areas where research dollars may best be spent.

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level. What do users expect and what degree of damage can a plant withstand? Finally, all options to control must be considered, including cultural controls, natural controls, and breeding site elimination.

GOLF

Recertification seminars precede GCSAA show

Seven seminars on subjects ranging from pesticides to photography have been scheduled just before the opening of the 51st International Turfgrass Conference and Show in St. Louis, Feb. 17-22. The seminars will be taught by nationally recognized experts and will be worth points toward certification renewal.

Seminar subjects include: landscape design theory, personnel management, irrigation equipment operation, pesticide use for insect control, turf nutrition, photography, and cardiopulmonary resuscitation. Each seminar lasts two days and is followed by an optional examination for points.

The Golf Course Superintendents Association of America also announced that Toro Chairman David McLaughlin will present the keynote address to start the show off. McLaughlin will speak on the subject, "Are we savers or spenders?"

TREES

Christmas tree crops up in North Carolina

Tar Heel Christmas tree farmers are reporting a 40 percent increase in their harvest for this year over the last two years. Farmers have planted enough trees to triple production by 1983. Extension Forestry Specialist William Huxster of North Carolina State University said, "We are now cutting about four percent of the Christmas trees sold in the United States each year. Our goal is 15 percent of the national market."

About 60 percent of the Fraser fir, white pine, Virginia pine, and Eastern red cedar grown in the state is exported. Conservatively estimated, the 1979 crop will bring growers roughly $10 million.

How Roundup® helped Jim Siegfried renovate this fairway in days, without closing it for one minute.

Take a good look at this good-looking fairway.

Last fall, Jim Siegfried found a way to clean it up, without tearing it up—at the height of his club's busy season. With Roundup® herbicide by Monsanto.

Jim is the Greens Superintendent at Losantiville Country Club, Cincinnati, where bermudagrass had become a serious problem on the 18th fairway. To control it, Jim applied Roundup once—while the weeds were still actively growing—right at the start of the Labor Day weekend.

"That's really 'prime time' here," Jim told us. "But after we applied Roundup, we kept the fairway in play the whole weekend, and after. The members played right over it, with no problem."

Since Roundup has no residual soil activity, and won't wash or leach out of treated areas to injure desirable plants, Jim simply took normal precautions against spray drift—and didn't worry about damaging desirable vegetation along the fairway.

Even better, he was able to reseed right into the dying bermudagrass only 7 days after applying Roundup—without loss of playing time or inconvenience to the membership.

Reinfestation won't be a big problem for Jim, either. He knows that Roundup destroyed the rhizomes of the treated weeds, helping prevent their regrowth.

Jim thinks he'll use Roundup again this year—and apparently some club members hope so, too. "As soon as they saw how good this fairway looks, some of the members started asking when I'm going to do the same for #10, where we have some more bermuda. I'll probably tackle that with Roundup this fall."

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IMPLEMENTING A STREET TREE INVENTORY AND PLANNING SYSTEM

By Leonard E. Phillips, Jr., Park Superintendent, Wellesley, MA

The planting of street trees has become very scientific and highly specialized. Because so many things must be taken into consideration when planting trees along our streets, it is most important to select the right trees and place them properly for permanent growth and lasting beauty.

This article in intended to summarize two urban forestry studies. The first is the complete inventory and analysis of the existing street trees within a community. This is often followed by the computerization of tree data for ease with record maintenance and information retrieval.

The second study pertains to the development of a comprehensive Master Street Plan. This plan documents and summarizes the inventory and provides the analysis needed to permit the development of a comprehensive master plan.

Why should all of this planning be undertaken for the sake of a few trees? Community trees are like any other community asset, they have value and they must be maintained to protect that value.

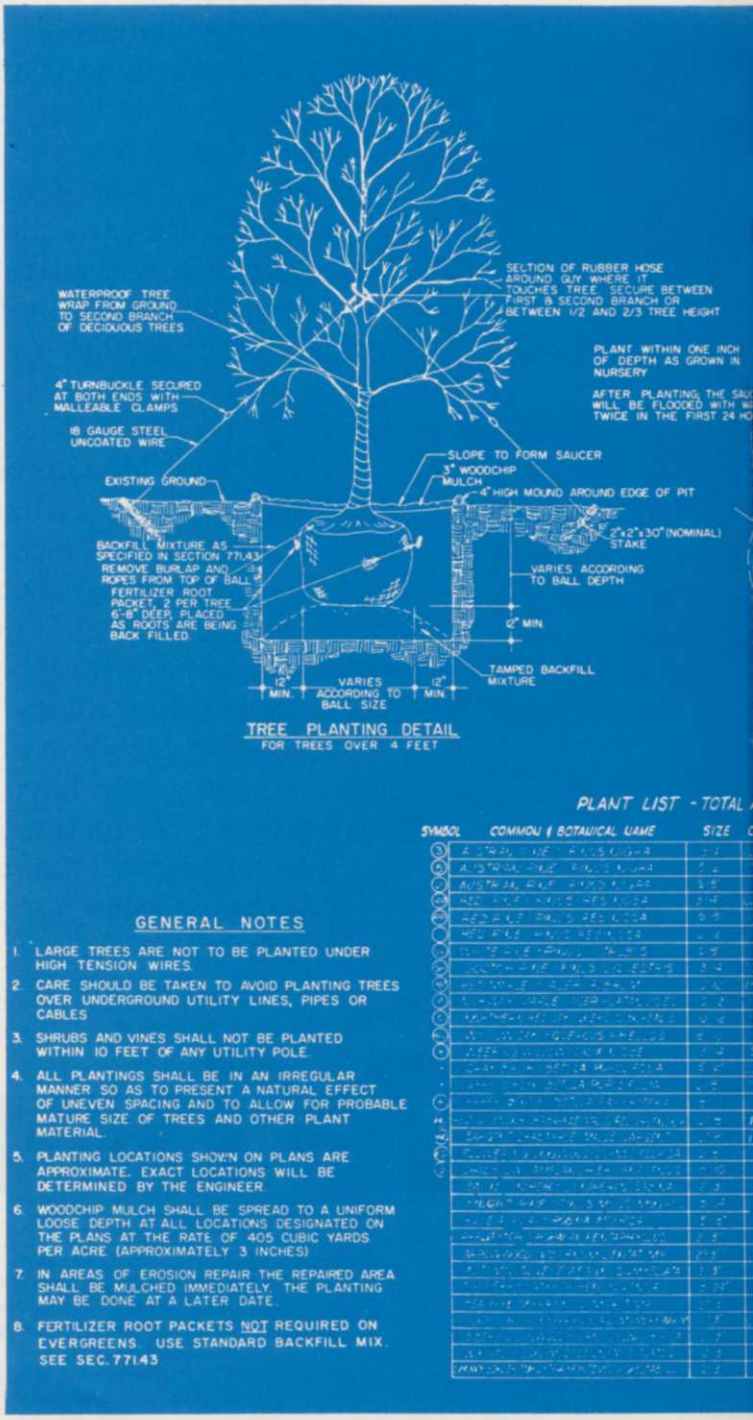
Furthermore, trees provide valuable contributions to man and his environment. For example, 78 trees are needed to absorb carbon dioxide and produce the oxygen for one person; 20 trees are required to offset the pollution of a car driving 60 miles per day; trees provide a natural summer air conditioner; and trees provide food and shelter for wildlife. Trees can be used to screen sun, sound, wind and unsightly views; to provide privacy; and to add beauty to our environment with graceful shape, colorful foliage, fragrant flowers and unique fruit. Most communities are proud of their trees.

Street tree inventory

Any street tree inventory should be undertaken with the following objectives:

1. To count all street trees growing within community boundaries.
2. To count all trees by species.
3. To record needs and problems observed, such as fertilizing, disease, shade canopy, insect damage, conflicts with utilities, and other evaluative data.
4. To employ the information gathered in programming tree care activities and to point out needs for additional plantings or alterations to the streetscape.

Once this data is obtained, it should be organized to serve as a useful and available source of information for an ongoing tree care program. The street trees could be mapped to depict an overall image of the tree canopy throughout the community.

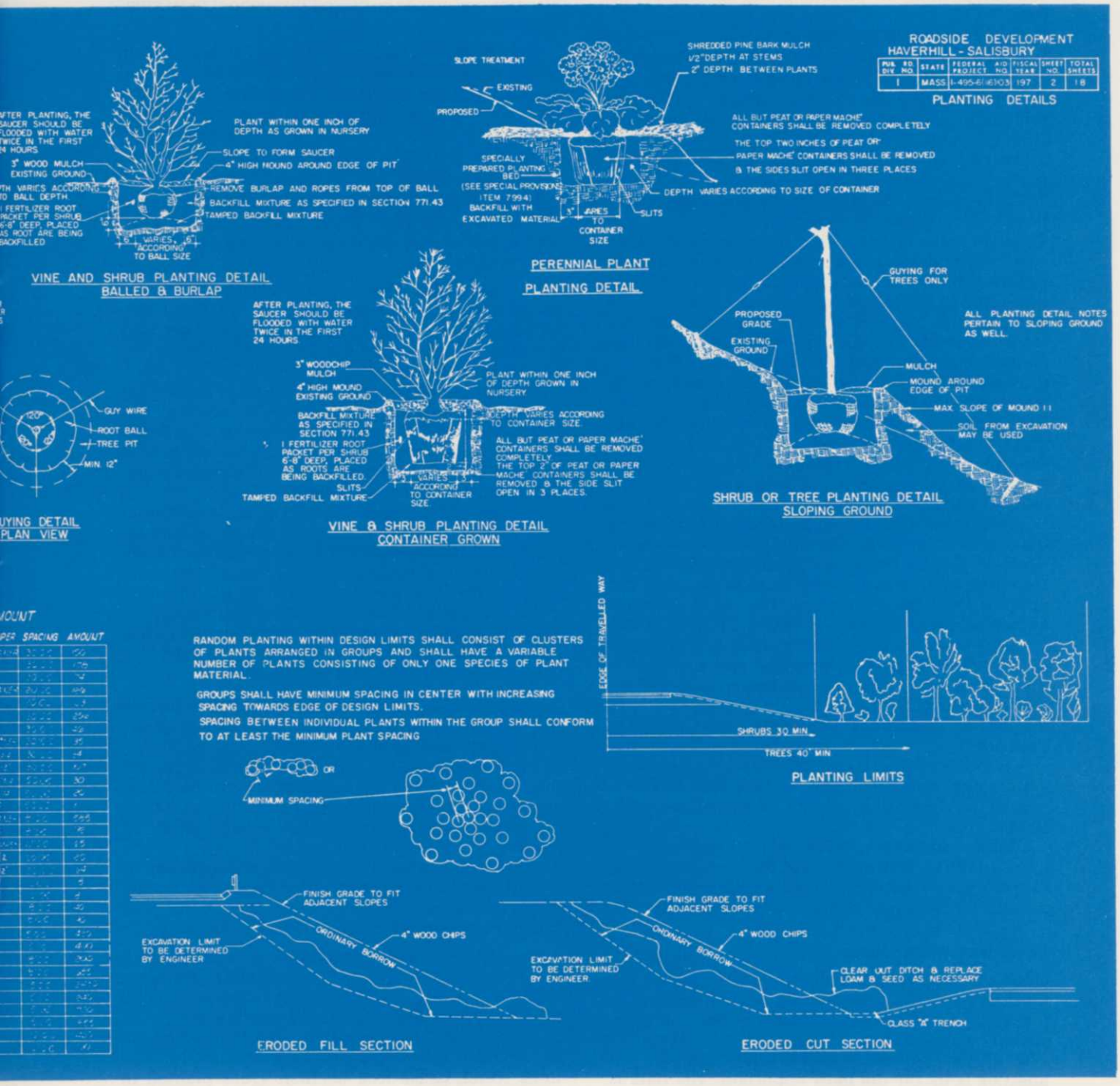


Leonard E. Phillips, Jr., is superintendent of the Wellesley, MA, Park and Tree Division. His responsibilities include the adminsitration of 31 employees, care of 700 acres of park land, and maintenance and planning for more than 40,000 street trees. He is a registered landscape architect in nine states. He has a degree in horticulture and landscape architecture from the University of Illinois and an associate degree in applied science from the State University of New York.

The first step involved in the planning process should be the preparation of lists of the most desirable selections for future planting along the community's streets. The plant materials selected must be hardy and sufficiently tolerant to survive harsh roadside conditions . It is advisable to use trees that are "native cultivars". These are defined as improved strains of the native varieties of trees.

The plant list selection process is quite involved. First, extensive lists of native plant material are prepared. These lists are modified by removing those materials which experience has indicated will do poorly in roadside conditions, have high maintenance costs, are disease prone, and have fruiting hazards. Then, the lists are supplemented with cultivars which would be satisfactory substitutions for the native species in terms of disease resistance and improved visual qualities. Finally, the lists are supplemented with introductions which have become established and tolerant of growing conditions in the community. These introductions are included only to provide a well-rounded selection and sufficient number of species for proper diversification.

In order to further refine the selection process, it is advisable to compare the selection with the rec-



ommendations of other authorities. These authorities can be from nurseries, local universities or the extension service. Books should be checked for ideas too.

Upon completion of a list of street trees, a determination has to be made with regard to the environmental preferences of each tree species. The list of selected trees should be made according to soil preferences: such as trees which tolerate moist soil, dry soil or a wide range of soils; salt tolerance; hardiness; excessive sun; shade tolerance; wind abuse; and finally urban site tolerance in terms of soil compaction, air pollution, and mechanical injury.

This data should be computerized. The purposes for establishing a computerized tree inventory are:

1. To make inventory data more readily available, thereby assisting the tree department staff in intelligently answering complaints and questions from the public.
2. To help in species selection for new planting plans.
3. To improve scheduling of maintenance operations and the overall tree care program.
4. To increase efficiency of administrative duties such as budgeting and preparation of annual reports. The type of data included should be listed according to street address, map number and tree number; the location of each tree and distance from the curb; tree species; house set back; tree caliper, condition and monetary value. The program should be designed to include a history of the tree regarding trimming, spraying, removal or annual growth. From the stored information the program should produce data on street and number, tree condition, distance from the curb, tree caliper, tree value, tree species, work needed, reference number and combinations of these.

Several preprogrammed systems for automating the storage, retrieval and analysis of trees have been developed for municipalities not having the resources or in-house capabilities to develop and operate their own programs. One of the better-known of these systems is called TRESYSTM. It features an efficient inventory process, routine updating and storage of all practical data needed for the care of every tree. The system was developed by Professor H.D. Gerhold and C.J. Sacksteden of the Forest Resources Laboratory in University Park, PA.

Another street tree inventory and management system has been developed by Asplundh Environmental Services, Blair Mill Rd., Willow Grove, PA, 19090.

Other companies offer similar services to municipalities. However, all of the basic programs, inventory and other services vary somewhat in sophistication as well as cost to the community.

Street tree master plans

Upon the completion of the inventory (unless the inventory is to be considered a part of the master plan), the second study, a master street tree plan, should be undertaken.

Of all the environmental considerations, the soil analysis is by far the most important. The data is compiled to correspond to the environmental preferences of the trees. A soils map should be prepared to show only the minimum number of categories of soils, examples of which are as follows:

Moist Soils: These areas contain muck, peat, silt and sandy soils with a high water table most of the year. These soils may be drained or covered with fill in order to permit development, but the moist, heavy soil types are still present at a depth sufficient to require trees which prefer moist soil. These areas are located in the low lying areas along streams and ponds scattered throughout most communities.

Dry Soils: These well-drained areas contain sands or mixed sand and gravel. These soils and water tables are sufficiently deep to provide a dry and well-drained site preferred by many trees. These soils are in the moderate elevations, higher than the wetlands but lower than the stony, irregular topography of the highest elevations.

Mixed Soils: These areas contain poorly sorted soil mixtures of rock, gravel, sand, silt, and clay. The depth of this material varies from 0 to 20 ft. over the bedrock.

Alluvial Soils: These areas contain the same poorly sorted soils as the mixed soil areas but are located in the original flood plains of rivers and streams. The trees to be planted in these areas may be subject to occasional flooding.

Another environmental consideration pertains to an evaluation of the existing forested areas of the community and, if possible, the native vegetation analysis of the community. The important features to be studied are the species and, if local information is available, the tree height .

A study of land uses must be made in combination with an analysis of the existing street tree inventory in order to establish the aesthetic character of the neighborhoods and areas of the community. The land use map should be simplified to show generalized land uses along with a breakdown of neighborhoods. The combined effort illustrates categories which are shown on a land use map and typically defined as follows:

1. Commercial/industrial areas: these heavily developed areas are for the most part devoid of any significant, healthy street trees.
2. Institutional/open space areas: these areas are the large protected open spaces where the forest succession process will occur naturally and where the existing forest trees often exceed 40 ft. in height.
3. Residential neighborhoods: each neighborhood is defined according to location, lot size and major tree associations.
4. Other areas as they apply to local community.

There are several miscellaneous factors which must be considered prior to the planting of trees in order to insure proper growth and minimum damage. These environmental hazards are:

1. Severe salt accumulation: Winter salting on streets results in accumulations at specific locations which cause tree decline. Trees planted in

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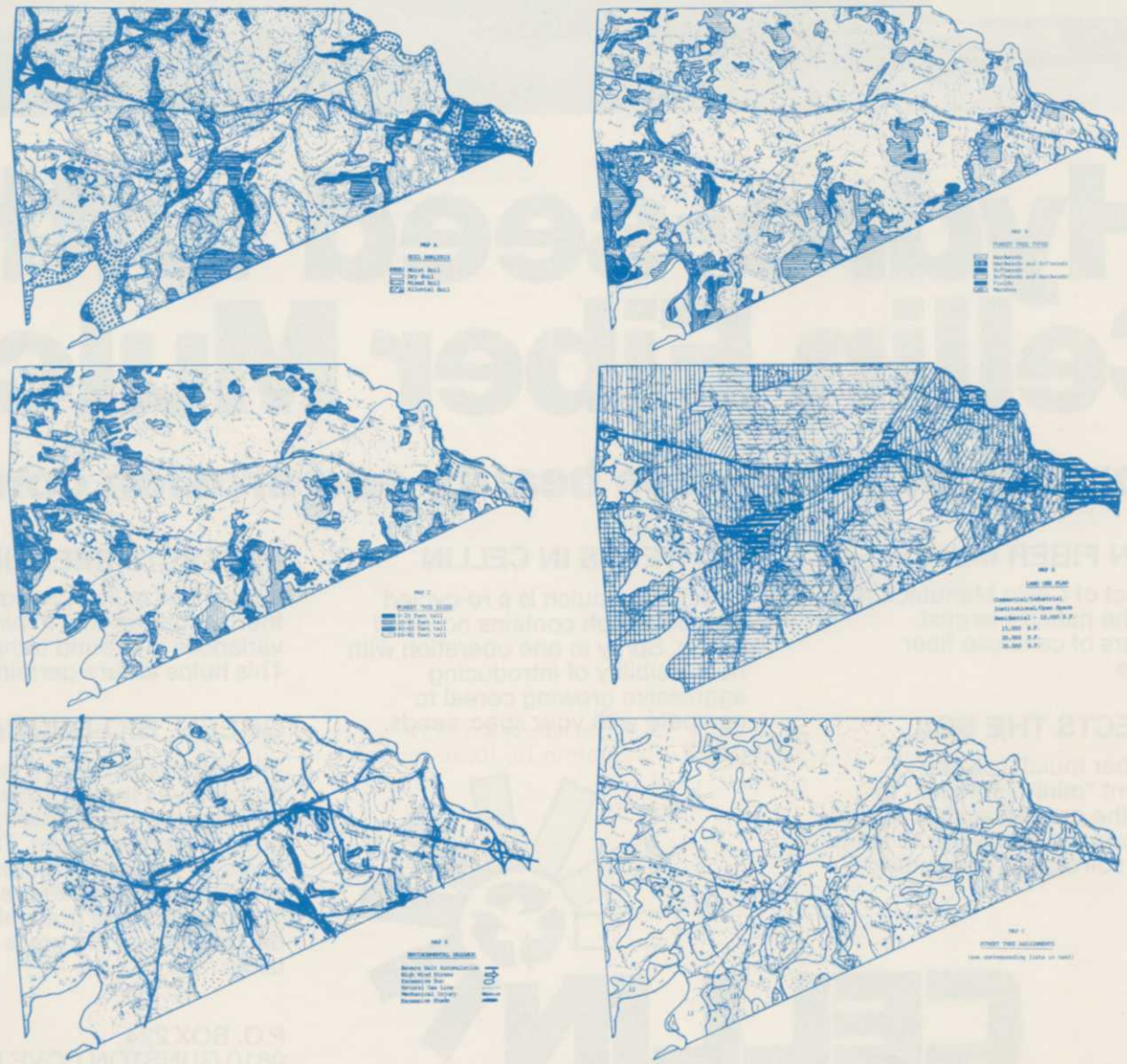
these areas must be tolerant of high salt concentrations in the rootzone.
2. High wind stress: Areas which are open, require hardier trees and guy wires until the trees are established.
3. Excessive sun: Areas which are open to full sun require trees which are not suceptible to sun scald.
4. Excessive shade: Areas which are shaded by large buildings, land forms or an established tree canopy exceeding 60 ft. in height, require trees planted in these areas to be tolerant of shade.
5. Natural gas lines: Many streets contain local gas distribution lines and damage to trees from escaping natural gas cannot be avoided. Any major gas transmission lines going through the community should be avoided to prevent potential tree damage.
6. Mechanical injury: Areas which are subject to severe mechanical injury, frequent construction and sites of severe soil compaction, require trees to be small in size and where problems are most severe, containerized trees should be considered.

Tree selection process

A tree's shape or form is an important consideration when selecting a tree for a particular site. Definitely shaped street trees and ornamental flowering or fruiting trees should be carefully selected and located to avoid distractions to a car's driver while at the same time providing an accent denoting a special view or structure. The trees should be used to frame pictures in the landscape, to hide objectionable views and to assist in defining the edge of the roadway and enhancing spatial qualities. Spacing between trees should vary from 30 to 150 ft. to create a naturalized appearance, and if one tree dies or is removed, it does not spoil the continuity of the planting. Trees need sufficient unpaved areas for maximum health and vigor. They



Six maps are necessary to combine all factors affecting street trees to achieve the best plan. Map A - soil analysis, Map B - forest tree types, Map C - forest tree sizes, Map D - land use plan, Map E - environmental hazards, Map F - street tree assignments.

should not be dangerously close to traffic in the street and should, therefore, be planted behind the sidewalk to achieve as much growing environment as allowable.

Trees should be planted in locations which define an activity. For example, a corridor of trees promotes movement and decisive action; and screening provides a blocked vista and results in interest in the foreground.

Aesthetics and function should work together during the selection of an urban tree.

A diversification formula has been developed to prevent an over dependence on a single genus such as elms or oaks. The diversification formula was established by the International Society of Arboriculture and is now an accepted standard throughout the United States. The formula is defined as a planting plan containing no more than ten percent of one family and five percent of one species.

In order to develop a concept of complementary and coordinated tree planting, the trees selected previously have been grouped together into associations. Tree associations are defined as consisting of a group of trees which are aesthetically harmonious as well as being similar in environmental preferences and tolerances.

Using the lot size as an indication of relative home value and also of potential area for tree growth, the lists are delegated according to mature tree stature, color and visual appearance.

All of the previous information is brought together to form a street tree planting plan. The different areas of soil types, existing vegetation and environmental hazards can be combined on one map to illustrate different tree planting programs. Each different area contains a different tree list. The tree list is derived by an analysis of the specific environmental qualities combined with the diversification formula.

Thus, lists are established which correspond to a street tree assignment map and indicate the most suitable trees for each area.

The final selection of a tree should be determined by the municipality's staff working in conjunction with the plan, any local site problems, and the property owner.

The final section of every master plan should pertain to established policies related to the care of street trees. These policies should be approved by the community's tree policy making board or elected officials.

Policies can be prepared to indicate a planting policy, a tree trimming policy, a tree removal policy, a spraying policy, and perhaps procedures to be used for implementing each of the policies.

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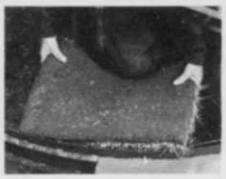

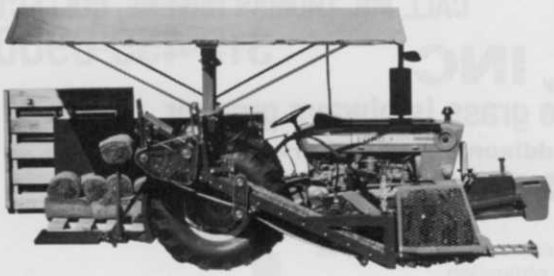

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1979 INDEX

KEY: Feature Article (fa), Vegetation Management (vm), Proscope Answer (p)

A

African Savannah, Asian Swamps Make California Zoo Home (fa) ..... Jan. 34
Agitation Effective For Wettable Powders (vm) ..... Apr. 76
Anti-desiccation For Winter Protection (vm) ..... Mar. 78
Applicators Must Know Mixing Basics, Professional by Paul A. Sartoretto, Ph.D. (fa) .. Mar. 24
Aquatic Herbicides Designed for Environmental Compatibility by James C. Schmidt (fa) ..... Jun. 42
Aquatic Herbicides, Water Management Report Supports Increased Use Of (fa) ..... Sep. 20
Asplundh Is Large Part Of Right-Of-Way History (fa) ..... Feb. 54
Athletic Field Construction Procedures, New Jersey Turfgrass Expo '78 Emphasis On Turf Production by Dr. H. W. Indyk (fa) Jan. 42
Award Winners, Contractors Describe Projects Chosen as 1979 by Bruce F. Shank (fa) ..... Mar. 24

B

Bagworms, Effective Chemical Control (vm) ..... Mar. 78
Bark To Split On Newly Planted Trees, What Causes (vm) ..... Sep. 94
Baseball Field In The West, How To Prepare And Maintain A (fa) ..... Feb. 27
Beetle Control: Biological And Chemical, Japanese (fa) ..... Apr. 62
Bentgrass Establishment On High Sand Greens (p) ..... Jan. 54
Bermudagrass Out Of A Bluegrass Lawn, How Do You Keep (vm) ..... May 60
Bird Pest Control By Trimming Favorite Trees Shown Effective (fa) ..... May 28
Bluegrass Control With Posan, Annual (p) ..... Mar. 84
Bluegrass (Kentucky), For Shaded Areas (vm) .... Sep. 94
Brush Control Around Pine & Spruce Trees (vm) ..... Mar. 78

C

California Landscaper Nurtures Plants In Urban Environment (fa) ..... Mar. 62
Chain Saw Use Linked To Technique, Size (fa) ..... Aug. 16
Chestnut Blight, Solving The Problem (vm) ..... Aug. 41
Compost Mix, Wood Chips and Sludge Form Rich by John A Kerr (fa) ..... Sep. 14
Contractors Describe Projects Chosen as 1979 Award Winners by Bruce F. Shank (fa) ..... Oct. 29
Crabgrass, Effectiveness of Preemergent Herbicides (vm) ..... Jan. 52 Mar. 78
Cultivar Performance In Sod Blends And Mixtures by Robert W. Schery (fa) ..... Feb. 16

D

Devrinol, Information On (vm) ..... Jun. 68
Disease, Causes of Environmental, Symptoms And Conditions Of Environmental Tree Disease by Eugene P. Van Arsdel (fa) ..... Jun. 16
Disease, Symptoms And Conditions Of Environment Tree by Eugene P. Van Arsdel (fa) ..... Jun. 16
Di-System For Leaf Miner Control (vm) ..... Oct. 45
(Dormancy) Is It Possible To Rejuvenate Turfgrass ..... Oct. 45
Drainage Tubing, Considerations For Use Of Corrugated (fa) ..... Mar. 16
Dutch Elm Disease, Are Tulip And Basswood Trees Susceptible To (vm) ..... Sep. 94
Dutch Elm Disease Control (vm) ..... Aug. 41
Dye Product Can Be Mixed With Trimec Weedkiller, What Green (vm) ..... Apr. 76

E

Energy Crisis, How Will It Effect The Future Of The Industry (p) ..... May 64
Engine Ailments For Prevention And Correction, Analyzing by Paul Scholten (fa) ..... Jul. 20
Engine Maintenance Needs, Rings And Pistons Indicate by Paul Scholten (fa) ..... Aug. 38
Engines, Selection for Pump Systems (fa) ..... Dec. 29
(Equipment) Fall Is the Time To Review Or Begin Preventative Maintenance Program by Philip A. Taylor (fa) ..... Oct. 36
Equipment Maintenance, Making The Most Of by Bruce F. Shank (fa) ..... Jun. 39
Euonymous Scale, Chemical Control Of (vm) ..... Oct. 45
Evergreen, Products That Inhibit Growth (vm) .... Jun. 70
Evergreen Shrubs That Can Be Used As A Screen And Will Tolerate Shady Conditions (vm) ..... Oct. 45

F

Fall Plantings, Protecting from Winter Damage by Maria T. Cinque (fa) ..... Nov. 14
Fertilization, Liquids Opposed To Granular (vm) ..... Aug. 41
Fertilization Of Athletic Fields, New Jersey Turfgrass Expo '78 Emphasis On Turf Production by Jerry Hutchinson (fa) ..... Jan. 42
(Fertilizer) How Does IBDU Fine Differ From Powdered Ureaform (vm) ..... May 60
Fertilizer, Sulphur-Coated Slow-Release, Changes In The Soil (vm) ..... Jul. 32
Fertilizers Do Not Promote Root Growth, Is It True That Liquid (vm) ..... Apr. 76
Fertilizers, How They Work (vm) ..... Dec. 38
Fertilizing A Large Number Of Trees, Is There A Machine Or System (vm) ..... Sep. 95
Fertilizing Newly Planted Trees (vm) ..... Sep. 95
Future, Green Industry (fa) ..... Dec. 32

G

GCSAA Winter Conference Report Sessions, Show Drew Over 6,000 (fa) ..... Mar. 57
Galls, Oak Trees Covered With (vm) ..... Jul. 32
Geochemical Factors Affecting Plant Growth In Reclamation by W. Clark Ashby, William C. Hood, and Mary L. Guerke (fa) ..... Apr. 28
Graft Incompatibilities (vm) ..... Jul. 32
Greens, How To Encourage Deep Rooting Of (p) ..... Jan. 54

Greenskeepers Preserve Natural Challenge Of Courses Scottish by Stan Metsker (fa) ..... Mar. 48
Groundcovers and Shrubs That Are Salt Tolerant (vm) ..... Jul. 32
Groundscovers Provide Alternative To Turfgrass In Landscaping by Donald H. Steinegger & Kim W. Todd (fa) ..... May 38
Growth Regulators Accentuated By Rising Costs by R. P. Freeborg (fa) ..... Aug. 25
Growth Regulators Pros And Cons, Penn State Tests Reveal by Thomas L. Watschke (fa) ..... Aug. 32
Growth Regulators, Suburban Mowing Efficiency Improved by (fa) ..... Feb. 60
Growth Retardants For Ivy (vm) ..... Jun. 68
(Growth Retardants) Products That Inhibit Growth On Broad Leaf Evergreens (vm) ..... Jun. 70

H

(Herbicide) What Post-emergent Control Can Be Applied Without Injury To Desireable Turfgrass (vm) ..... May 60
Herbicides Designed For Environmental Compatibility, Aquatic by James C. Schmidt (fa) ..... Jun. 42
(Herbicides) Postemergents Available For Control Of Nutsedge In Turf by John A. Jagschitz (fa) ..... May 46
Herbicides, Timing, Rate Are Critical For Preemergence by Robert C. Shearman, Ph.D. (fa) ..... Mar. 39
Herbicides, Water Management Report Supports Increased Use of Aquatic (fa) ..... Sep. 20
Hydraulic Seeding, Clearing Up Mysteries Will Aid Growth Of, by Bruce F. Shank (fa) ..... May 32

I

(IPM) Integrated Control Strategies Established For Tree Insects by David G. Nielson, Ph.d. (fa) ..... May 20
Insurance Purposes, How To Appraise Trees and Plants For (fa) ..... Jan. 24
Irrigation Benefits, Michigan Nurseryman Boasts Of Trickle by Dan Hager (fa) ..... Feb. 63
Irrigation, Conference Presents Information On Wastewater Irrigation (fa) ..... Jan. 49
(Irrigation) Is It Better To Water Turf In Day Or Night (vm) ..... Oct. 45
Irrigation Renovation Decisions and Maintaining System Efficiency (fa) ..... Jan. 16

J

Japanese Beetle Control: Biological And Chemical (fa) ..... Apr. 62

L

Landscape Architect Training Correspondence (p) ..... Mar. 84
Landscape Architecture, List Of Schools Offering (p) ..... Feb. 72
(Landscape Awards) Contractors Describe Projects Chosen as 1979 Award Winners by Bruce F. Shank (fa) ..... Oct. 29
Landscape Contracting Business, Are There Any Industry Averages Breaking Out Income and Expenses Within The Landscape Design and (p) ..... Jun. 72
Landscaper Nurtures Plants In Urban Environment, California (fa) ..... Mar. 62
Lawn Care Business, A Successful, New Jersey Turfgrass Expo '78 Emphasis On Turf Production by Robert H. Brewster (fa) ..... Jan. 42
Lawn Disease Problems, New Jersey Turfgrass Expo '78 Emphasis On Turf Production by Dr. Spencer (fa) ..... Jan. 42

M

Maintenance, Making The Most of Equipment by Bruce F. Shank (fa) ..... Jun. 39
Maintenance Planning Begins With Good Design, Park by Theodore J. Haskell (fa) ..... Jan. 28
Maintenance Program, Fall Is The Time To Review Or Begin Preventative by Philip A. Taylor (fa) ..... Oct. 36
Maple Wilt (vm) ..... Nov. 28
Moles, Any New Methods To Kill (vm) ..... Jun. 68
Municipal Managers Compete for Budget Funds (fa) ..... Nov. 18
Myrtle, Canker and Root Rot (vm) ..... Nov. 28

N

New Jersey Turfgrass Expo '78 Emphasis On Turf Production (fa) ..... Jan. 42
Nutsedge In Turf, Postemergents Available For Control Of by John A. Jagschitz (fa) ..... May 46

O

Oak, Spit Spot (vm) ..... Nov. 28
Oaks Suffering From Soil Compaction Due To Construction (vm) ..... Sep. 94
Oil To Sterilize Soil Under Gravel Beds, Crankcase (vm) ..... Mar. 78
Ornamentals Injured By Cold Winter Weather (vm) ..... Apr. 76

P

Park Maintenance Planning Begins With Good Design by Theodore J. Haskell (fa) ..... Jan. 28
Park Supervisors Adjust To Financial Pressures by John Kerr (fa) ..... Oct. 14
Pipe Location Without Disturbing Large Areas Of Turf (p) ..... Aug. 43
Poa Annua, Heat Stress, Not Anthracnose Is Scourge Of, by Houston Couch ..... Jun. 47
Poison Oak, Control Of (vm) ..... Apr. 76
Postemergents Available For Control Of Nutsedge In Turf by John A. Jagschitz (fa) ..... May 46
Preemergence Herbicides, Timing, Rate Are Critical For by Robert C. Shearman, Ph.D. ..... Mar. 39
Procedures of Pesticide Development, New Jersey Turfgrass Expo '78 Emphasis On Turf Production by Ernie Koch (fa) ..... Jan. 42
Professional Applicators Must Know Mixing Basics by Paul A. Sartoretto, Ph.d. (fa) ..... Mar. 24
Pruning, Management of Operation by Harleigh Kemmerer (fa) ..... Dec 35

R

Railroad Control Are Long Days And Constant Care, Challenges Of (fa) ..... Sep. 89
Railroad Reclamation Restores Indian Land, Railroad (fa) ..... Sep. 92
Reclamation, Geochemical Factors Affecting Plant Growth In by W. Clark Ashby, William C. Hood and Mry L. Guerke (fa) ..... Apr. 28
Reclamation Grass Selection Depends On Combination, Cost (fa) ..... Jul. 24
(Reclamation) Persistence of Vegetation on Toxic Spoil, by Paul Sutton (fa) ..... Nov. 22
Reclamation Restores Indian Land, Railroad (fa) ..... Sep. 92
Rhodendron, What Food Should Be Used (vm) ..... Aug. 41

Right-Of-Way History, Asplundh Is Large Part Of (fa) ..... Feb. 54
Root Disorders, Detection And Correcting Of Tree by Michael J. Walterscheidt, Ph.D. (fa) ..... Jun. 31
Ryegrass, Best and Cheapest That Will Grow In Clay Without Watering and Little Mowing (p) ..... Jun. 72
Ryegrass, Life Span Of New Turf Type Perennial (p) ..... Jun. 72

S

Salt-Tolerant, Shrubs and Groundcovers That Are (vm) ..... Jul. 32
Saw, Use Linked To Technique, Size; Safe (fa) ..... Aug. 16
Scottish Greenkeepers Preserve Natural Challenge Of Courses by Stan Metsker ..... Mar. 48
Seed Mixtures For Sod Production, New Jersey Turfgrass Expo '78 Emphasis On Turf Production by Dr. C. Reed Funk (fa) ..... Jan. 42
Shrubs and Groundcovers That Are Salt Tolerant (vm) ..... Jul. 32
Silvex, Can Spreaders Be Cleaned Out After Applying (vm) ..... Jul. 32
Snow Mold Left Bare Spots, Should You Put Down Fungicide (vm) ..... Apr. 76
Sod Blends and Mixtures, Cultivar Performance In by Robert W. Schery (fa) ..... Feb. 16
Sod Field Days Include Visits To Scotts, Princeton (fa) ..... Jul. 28
Sod, Reroot After White Grub Damage, Will (vm) ..... Aug. 41
Soil Compaction From Foot Traffic (vm) ..... Jul. 32
Spruce, (Blue), Browning Needles (vm) ..... Jan. 52
Studies of Japanese Beetle Grub Resistance, New Jersey Turfgrass Expo '78 Emphasis on Turf Production by Dr. Sami Ahmad (fa) ..... Jan. 42
Sulphur-Coated Slow-Release Fertilizer, Changes In The Soil (vm) ..... Jul. 32

T

Tax and Insurance Purposes, How To Appraise Tree and Plants (fa) ..... Jan. 24
Thatch Accumulation, Changes In Management Needed Due To by Jack D. Butler (fa) ..... Apr. 54
Thatch, Difference With Mat (p) ..... Mar. 84
Thatch Information Is Helpful But Controversial, Latest R. C. Shearman (fa) ..... Apr. 46
Thatch On Soil Is Both Positive And Negative, Influence Of A. J. Turgeon (fa) ..... Apr. 48
Thatch To Disease And Insect Stress, Relationship Of by B. G. Joyner (fa) ..... Apr. 50
Tractors, Compact Diesel ..... Nov. 30
Training To Meet Industry Needs, Lake City Community College by John R. Piersol (fa) ..... May 54
Transplanting Out Of Season, Precautions For Digging And (fa) ..... Aug. 20
Tree, Chemicals To Prevent Crabapples From Falling Off (vm) ..... Jun. 68
Tree Disease, Symptoms And Conditions Of Environment by Eugene P. Van Arsdel (fa) .. Jun. 16
Tree Fertilizers, Liquid (vm)
Tree Insects, Integrated Control Strategies Established For by David G. Nielsen, Ph.D. (vm) ..... May 20
Tree Operation Cultivates Uses For Wood Chips (fa) ..... Sep. 16
Tree Rot Disorders, Detection And Correction Of by Michael J. Walterscheidt, Ph.D. (fa) ..... Jun. 31
Tree Spikes And It's Effects On Trees (vm) ..... Feb. 79
Trees And Plants For Tax And Insurance Purposes, How To Appriase (fa) ..... Jan. 24
Trees And Shrubs Recommended For Hardiness In The Northeast (fa) ..... Apr. 68
Trees, Chemicals To Eliminate Hard Water Deposit Buildup (vm) ..... Jun. 68
Trees, Fertilizing Newly Planted (vm) ..... Sep. 94
Trees Planted On Land Fills (vm) ..... Mar. 78
Trees, Master Street Plan by Leonard Philips (fa) ..... Dec. 18
Trees, Topping (vm) ..... Nov. 28
Trees, What Causes Bark To Split On Newly Planted (vm) ..... Sep. 94
Turf Areas, Repairing Damaged (vm) ..... Jun. 68
Turf Disease Control For Home Owner (p) ..... Sep. 96
Turfgrass Expo '78 Emphasis On Turf Production, New Jersey (fa) ..... Jan. 42
Turfgrass Insect Control Update, New Jersey Turfgrass Expo '78 Emphasis On Turf Production by Dr. Louis Vasvary (fa) ..... Jan. 42
Turfgrass, Is It Possible To Rejuvenate During Hot Summer Months (vm) ..... Oct. 45
(Turfgrass) Keys To Managing Zoysia Offered By Missouri's Dunn by George L. Zeis (fa) ..... Jul. 17
Turfgrass Transition In Both Spring And Fall, Managing by George M. Kozeinicky (fa) .. Apr. 16
Turf Under Heavy Use, Rehabilitation Of (p) .... Feb. 72
2,4-D In Controlling Dandelions, Using (vm) ..... Oct. 45

V

Verticillium In Maple Trees (vm) ..... Feb. 79

W

Water Conservation Today, Wetting Agents And Their Role In by Robert A. Moore (fa) ..... Jul. 30
Water Management Report Supports Increased Use of Aquatic Herbicides (fa) ..... Sep. 20
Water, The Future And Concerns Of Recycled, New Jersey Turfgrass Expo '78 Emphasis On Turf Production by Dr. Harry L. Motto (fa) ..... Jan. 42
Weed Control Is Not Just For Specialists, Nonselective (fa) ..... Feb. 36
Wetting Agents And Their Role In Water Conservation Today by R. A. Moore (fa) ..... Jul. 30
Whitefly, Effective Control (vm) ..... May 60
White Grub Damage, Will Sod Reroot (vm) ..... Aug. 41
(Wilt) Verticillium In Maple Trees (vm) ..... Feb. 79
Winter Damage, Protecting Fall Plantings by Maria T. Cinque (fa) ..... Nov. 14
Winter Fertilization Of Lawns, New Jersey Turfgrass Expo '78 Emphasis On Turf Production by Dr. Ralph E. Engel (fa) ..... Jan. 42

Z

Zoysia Offered by Missouri's Dunn, Keys To Managing by George L. Zeis (fa) ..... Jul. 17

Authors

Ahmad, Sami, Studies of Japanese Beetle Grub Resistance New Jersey Turfgrass Expo '78 Emphasis On Turf Production (fa) ..... Jan. 42
Ashby, Clark W., Hood, William C., Guerke, Mary L. Geochemical Factors Affecting Plant Growth In Reclamation (fa) ..... Apr. 28
Brewster, Robert H., A Successful Lawn Care Business, New Jersey Turfgrass Expo '78 Emphasis On Turf Production (fa) ..... Jan. 42
Butler, Jack D., Changes In Management Needed Due To Thatch Accumulation (fa) ..... Apr. 54
Carrow, R. N., Integration Of Control Methods Necessary To Prevent Thatch Buildup (fa) ..... Apr. 58
Cinque, Maria T., Precautions For Digging And Transplanting Out Of Season (fa) ..... Aug. 20
Cinque, Maria, T., Protecting Fall Plantings From Winter Damage (fa) ..... Nov. 14
Couch, Houston B., Heat Stress, Not Anthracnose is Scourge Of Poa Annua (fa) ..... Jun. 47
Davis, Spencer, Jr., Lawn Disease Problems, New Jersey Turfgrass Expo '78 Emphasis On Turf Production (fa) ..... Jan. 42
Engel, Ralph E., Winter Fertilization of Lawns, New Jersey Turfgrass Expo '78 Emphasis On Turf Production (fa) ..... Jan. 42
Freeborg, R. P., Need For Growth Regulators Accentuated By Rising Costs (fa) ..... Aug. 25
Funk, C. Reed, Seed Mixtures For Sod Production, New Jersey Turfgrass Expo '78 Emphasis On Turf Production (fa) ..... Jan. 42
Hager, Dan, Michigan Nurseryman Boasts Of Trickle Irrigation Benefits (fa) ..... Feb. 63
Haskell, Theodore J., Park Maintenance Planning Begins With Good Design (fa) ..... Jan. 28
Hutchinson, Jerry, Fertilization of Athletic Fields, New Jersey Turfgrass Expo '78 Emphasis On Turf Production (fa) ..... Jan 42
Indyk, H. W., Athletic Field Construction Procedures, New Jersey Turfgrass Expo '78 Emphasis On Turf Production (fa) ..... Jan. 42
Jagschitz, John A., Postemergents Available For Control Of Nutsedge In Turf (fa) ..... May 46
Joyner, B. G., Relationship Of Thatch To Disease An Insect Stress (fa) ..... Apr. 50
Kemmerer, Harleigh, Managing Pruning Operations (fa) ..... Dec. 35
Koch, Ernie, Procedure Of Pesticide Development, New Jersey Turfgrass Expo '78 Emphasis On Turf Production (fa) ..... Jan. 42
Kozeinicky, George M., Managing Turfgrass Transition In Both Spring And Fall (fa) ..... Apr. 17
Metsker, Stan, Scottish Greenkeepers Preserve Natural Challenge of Courses (fa) ..... Mar. 48
Moore, Robert A., Wetting Agents And Their Role In Water Conservation Today (fa) ..... Jul. 30
Motto, Harry L., The Future And Concerns Of Recycled Water New Jersey Turfgrass Expo '78 Emphasis On Turf Production (fa) ..... Jan. 42
Nielson, David G., Ph.D. Integrated Control Strategies Established For Tree Insects (fa) ..... May 20
Pierson, John R., Lake City Community College: Training To Meet Industry Needs (fa) ..... Jun. 16
Phillips, Leonard, Master Street Tree Planning (fa) ..... Dec. 18
Sartoretto, Paul A., Ph.D., Professional Applicator Must Know Mixing Basics (fa) ..... Mar. 24
Schery, Dr. Robert W., Cultivar Performance In Sod Blends And Mixtures (fa) ..... Feb. 16
Schmidt, James C., Aquatic Herbicides Designed For Environmental Compatibility (fa) ..... Jun. 42
Scholten, Paul, Analyzing Engine Ailments For Prevention And Correction (fa) ..... Jul. 20
Scholten, Paul, Rings And Pistons Indicate Engine Maintenance Needs (fa) ..... Aug. 38
Shearman, R. C., Latest Thatch Information Is Helpful But Controversial (fa) ..... Apr. 46
Shearman, Robert C. Ph.D., Timing, Rate Are Critical For Preemergence Herbicides (fa) ..... Mar. 38
Steinegger, Donald H. and Todd, Kim W., Groundcovers Provide Alternative To Turfgrass In Landscaping (fa) ..... May 38
Taylor, Philip A., Fall Is The Time To Review Or Begin Preventative Maintenance Program (fa) ..... Oct. 36
Turgeon, A. J., Influence Of Thatch On Soil Is Both Positive And Negative (fa) ..... Apr. 48
Van Arsdel, Eugene P., Symptoms And Conditions Of Environmental Tree Disease (fa) ..... Jun. 16
Vasvary, Louis, Turfgrass Insect Control Update, New Jersey Turfgrass Expo '78 Emphasis On Turf Production (fa) ..... Jan. 42
Walterscheidt, Michael J., Ph.D., Detection And Correction Of Tree Root Disorders ..... Jun. 31
Watschke, Thomas L., Penn State Tests Reveal Growth Regulator Pros and Cons (fa) ..... Aug. 32
Zeis, George L., Keys To Managing Zoysia Offered By Missouri's Dunn (fa) ..... July. 16

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SELECTING THE RIGHT ENGINE FOR AN EXISTING PUMP SYSTEM

By John A. Kerr, assistant editor

If you need to replace an engine in a spray unit or you are building your own, some basic criteria exist for picking the right engine. Pump manufacturers often buy engines from different companies and many of these engines are interchangeable.

The main consideration is sufficient horsepower. This depends on the type of pump you're using. According to Bob Oberg, an engineer at Broyhill, a piston pump requires considerably more power than a centrifugal pump. If you're using a centrifugal pump for high pressure and low volume spraying, power requirements are less than if you're using it for high volume and low pressure, as in a transfer operation. Then it requires much power to move the weight.

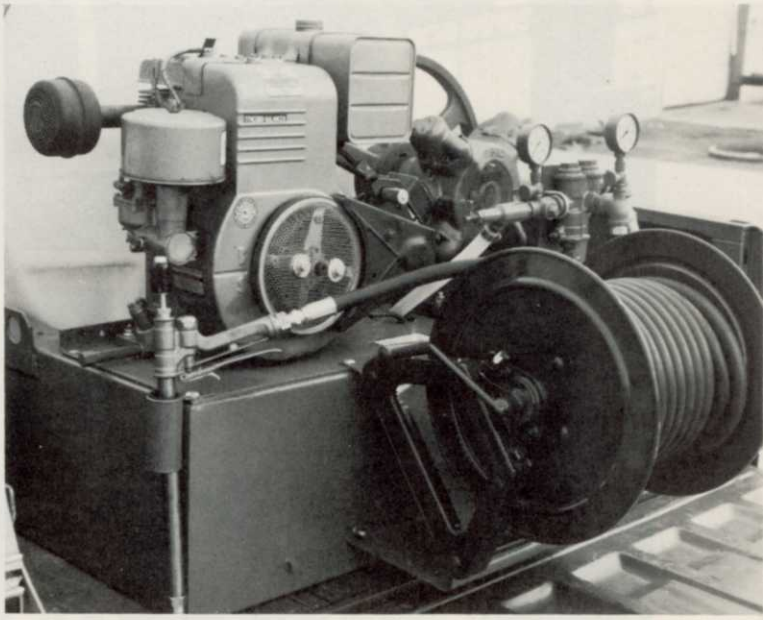
A centrifugal pump is self limiting. With too small an engine, it will slow down but still run; however, a positive displacement pump in that situation won't run at all. For example, you could use a 3-horsepower engine on a fairly big centrifugal pump and get it going but on a good-sized piston pump, it wouldn't start.

"Generally," Oberg says, "our centrifugal pumps seem overpowered because we put enough engine on them to handle big volume if necessary. In a common spraying situation, a pump may be able to handle 100 gpm even though an operator only needs 5 or 10; so he's not pulling all the power he could." You can also get by with a small engine for a roller pump, unless you put so much resistance against it that it has to create 200 to 300 pounds of pressure in order to work.

Broyhill uses Briggs & Stratton, Kohler, and Tecumseh engines for its pumps. Oberg warns of comparing an electric motor with a gas engine when making your decision. It's possible to drive a pump with a 2-horsepower electric motor that won't even start with a 2-horsepower gas engine. "A rule of thumb is that it's going to require twice as much gas horsepower as electric horsepower," Oberg says. The reason is: you have more power available because you can pull, at least momentarily, more amperage through the electrical system and increase the actual output of an electric motor. An electric line has the capability of giving you an initial surge of power that a gas engine can't. Also, in a higher elevation where the air is thinner, a gas engine will lose power.

Most pump manufacturers rate equipment according to actual electric horsepower. The horsepower and torque of an engine are geared to maximum rpm. Torque is an important factor in running your pump. Maximum rpm does not produce maximum torque.

You must also consider rpm's of the pump when selecting an engine. When you hook an engine to a pump, you should know how fast it is supposed to run so you can properly match it. There's nothing that will ruin a pump quicker than running it faster than it was made to run. You will cavitate the liquid, trying to suck more in than atmospheric pressure can push and cause the pump to wear itself out.



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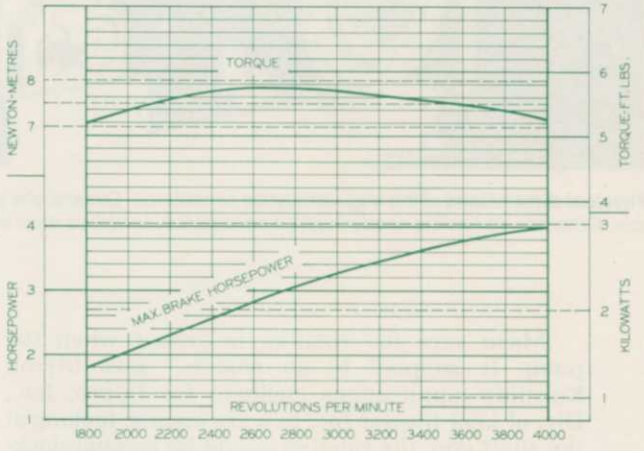

Maximum horsepower is obtained at maximum revolutions per minute. Maximum torque is obtained at a lower rpm. High rpm can lead to rapid engine deterioration. Therefore, optimum running speed should be designed near the maximum torque level.

If a pump has a 3,600 rpm engine and only needs 1,000 rpm to produce an efficient spray, you need a gear reducer — a system of belts and pulleys — to gear the PTO shaft down. Overspeeding the sprayer will cause internal damage.

Rpm's range from 600 for positive displacement pumps up to 4,000 for centrifugals, with some even reaching 5,000. Depending on the type of pump, rpm will vary greatly. As a general rule, centrifugal pumps have to run at a high rpm and positive displacement pumps — gear, roller, and piston — at a lower rpm.

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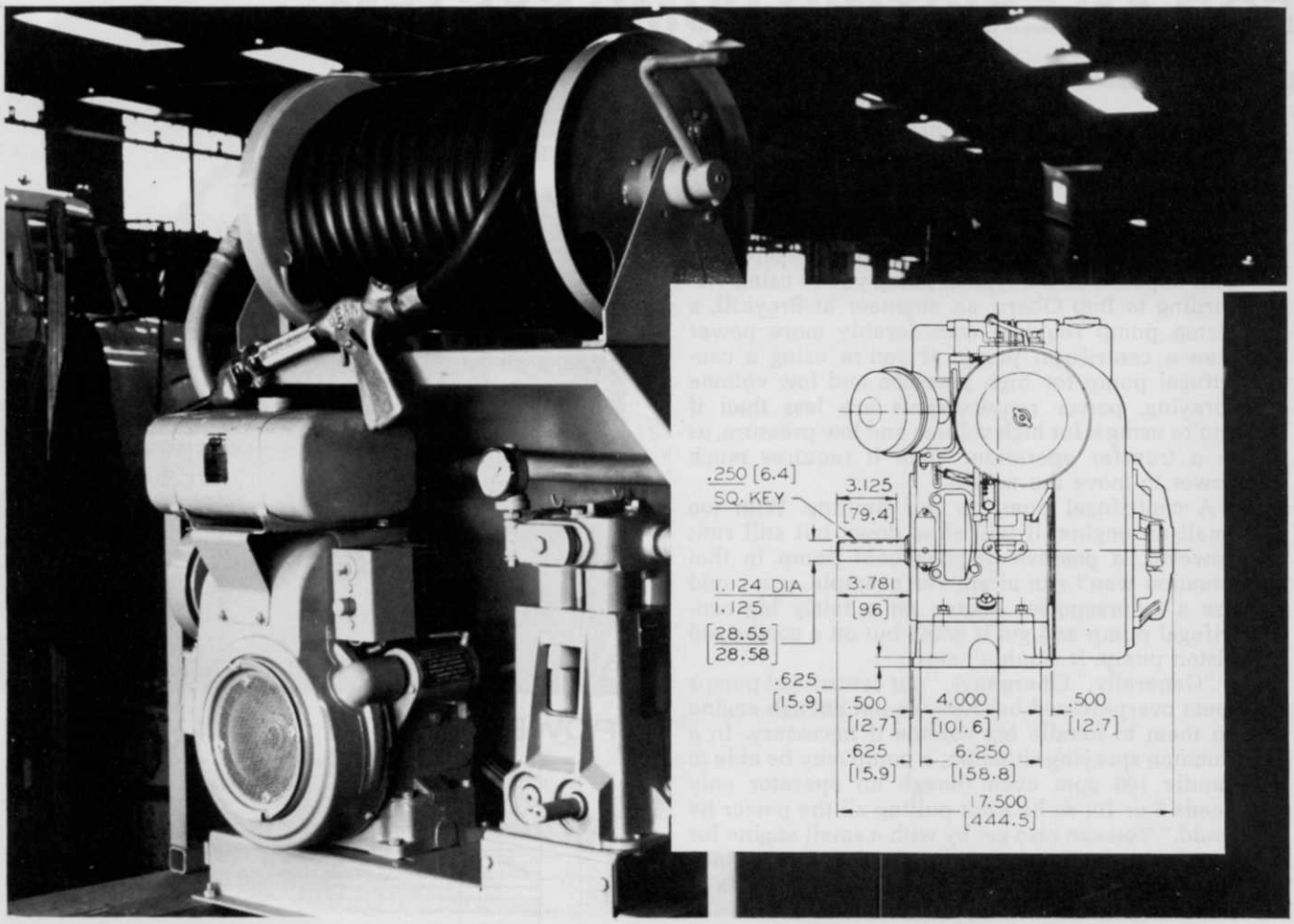

Physical dimensions of the engine must be considered. Dimensions of importance are base mounting holes, shaft size and length, and overall size. Exhaust and cooling needs must be considered, as well as ease of access for maintenance.

"Make sure the rotation is proper when the pump is coupled to an engine," says Myron Koistinin, applications engineer for Hypro, Inc., Div. of Lear Siegler Inc. In a gas engine, looking at the shaft end, the rotation would be counterclockwise. A roller, vein, or gear pump also must be rotated in the right direction. With a piston pump, you don't have to worry about it because a valve determines the flow.

The frame for an electric motor must be the proper height. A "58" is a standard frame for most electric motors. Some pumps take more torque to run and may need a capacitor for more starting torque.

Koistinin also suggests selecting a crankshaft with a fairly common diameter, length, and keyway. "If you get a motor or gas engine with an oddball shaft size, you have trouble getting pulleys and couplings to match," he says.

You have to look for pilots on the block, the machined surface that may be altered to accommodate a generator and other attachments, says Les Heinemann, service specialist in the engineering department of Kohler Co. "You have to make sure the pilots match so that if there is anything like an electric clutch hooked up to it, it's going to bolt to the block," he says. A bolt circle that doesn't match can also cause trouble.

Physical dimension of an engine is also important. Is it going to fit into the space you have available? You want to make sure where you're mounting the engine, also. Is it a standard engine without a blower or a directed air engine? If you put it in a combined area, are you going to get enough cooling?

You may consider fuel tank capacity if changing engines, says Jack Custer, product specialist for FMC, Agriculture Machinery Div. In a large operation, it saves time to have an engine that runs for a long period. You also need the right kind of pulley ratio, which depends on how fast you want to run your engine and thus how quickly the pump will turn.

Most manufacturers have replacement engines for the sprayers they build. But when it comes time to change engines because you are dissatisfied or discover new uses for your present sprayer, these will be some of the things to consider. **WTT**

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LABOR, PACE OF TECHNOLOGY TO CHANGE STANDARDS IN THE 80's

By Bruce F. Shank, Editor

This article is a stab at the future of the Green Industry in the next ten years. I don't suggest this projection to do anymore than to help us all think about the next decade in order to grow and prosper. It is an exercise in planning by imagination combined with current events. You will have your own version, no doubt. But just to have taken the time to think about more than today is beneficial and even inspirational.

1980 will be a tight year probably. We can't stop at 1980. If you are a good businessman in the first place you have a handle on debt. Be careful, but don't stop planning, don't stop looking ahead, and don't stop growing.

As the Green Industry enters the 1980's two factors will stand out, the pace will be much faster and standards for design and maintenance will change.

The 1980's will be the decade of the quick-thinking, well-trained, and progressive businessman. The small businessman will have to be especially sharp to keep abreast of the larger companies with greater resources for new technology. Economies of scale will keep the big company ahead technologically and even or cheaper pricewise. Rising labor costs will stunt the growth of those companies unable to cut labor costs through technology.

There will continue to be special niches where the small business can make it, but these niches will be changed by new standards in design and maintenance of landscapes. These standards will change in response to population trends, higher priced and less willing labor, and rising costs of petroleum-based products. Three standards will evolve: native vegetation with minimal maintenance, intense use areas, and display landscapes for brightening population centers. The residential or commercial lawn will fall under the third standard.

Interior plant displays will abound as centralized shopping and entertainment centers begin to dominate and centralize human behavior. Population centers will be nearly continuous as they are in parts of Europe and Japan. Commuting to work from remote areas around cities will be less common.

The 1980's will bring smaller and better residential lawns, smaller but intensely used parks, increased apartment and condominium living, technologically advanced golf courses, and highway rights-of-way requiring little or no maintenance.

There will be a clear delineation between low and high maintenance landscapes. Architects will be encouraged to specify lower maintenance plants in their industrial landscapes, but more exotic and high maintenance plants in malls and other activity centers. Parks, commons, schools and athletic grounds will require additional maintenance as use increases. Athletic fields especially will have to withstand extreme wear and be constructed to bounce back quickly. Versions of the Professional Athletic Turf (PAT) system originated by Daniels and Robey of Purdue will be necessary. Technological advances to enable turf to withstand extreme use will be developed in the next few years. Overall, parks and athletic areas will require more attention than they currently receive.

Numerous small parks could become an administrative problem for municipalities unless much of the maintenance is contracted out. Simplifying maintenance for the municipality and making the contractor more attractive an option would entail a broad service package including building maintenance, debris collection, initial reconstruction to make the park easier to maintain, and complete plant maintenance service. A weekly or even daily schedule for each park may be required to handle the demand placed upon the park grounds.

Similar conditions would exist for exterior and interior maintenance of malls and shopping centers. Offering a single service to the mall management lowers competitive advantage.

Lawn care will become the dominant method of care for non-irrigated industrial and residential property as the value of property rises. The lawn service, however, should be more inclusive of services such as mowing, pruning, planting, and design. Economies of scale would be achieved by specialized crews to handle specific tasks, combined turf and tree programs, and computerized routing.

Some residential tasks remain untouched by large lawn care companies, such as aerification, weed control and mulching around ornamentals, and thatching. Some lawn care firms choose to subcontract this type of work. Locating labor to perform such functions appears to be a problem, however.

Weed control and fertilization of both turf and ornamentals could be carried out by chemical injection into irrigation systems. Maintenance would thus be reduced to mowing, edging, and verticutting and aerification where needed.

In other words, many maintenance considerations will be solved at construction time rather than by continuous care. For example, although an irrigation system may seem a luxury, it could lower maintenance costs over the life of the system by reducing labor costs for fertilization, weed control, and irrigation. Small-scale irrigation systems which include injection devices will be offered soon, as well as a line of chemicals for injection systems. Growth regulators will be one of the chemicals to be applied by irrigation systems. Closer attention to soil pH and microbial conditions of the turf will control thatch accumulation. Correction of pH will be accomplished through irrigation injection.

Installation and maintenance of small-scale irrigation systems will create a new niche for Green Industry businessmen.

In the 80's, there will be higher standards for plant materials and maintenance in population centers and reduced emphasis or native standard for remote areas.

Golf courses, especially public courses, will be forced to adapt to intense use as the number of courses in relationship to the population decreases. New courses built as new population centers evolve will be designed and constructed with intense use in mind. Greens and tees will be much larger. Maintenance standards will change, especially for roughs. Native, low maintenance plants will dominate the rough to concentrate maintenance efforts on tees, fairways, hazards and greens.

Larger, more efficient equipment will be utilized to mow, aerify, and spray. Injection irrigation will take over much of the fertilization and weed control, especially on new courses. To gain better control of turf conditions, specifications for new courses will include improved drainage, thorough irrigation, better turfgrass cultivars, and careful composition of the rootzone. These specifications will increase construction costs but control maintenance costs in the future. Older courses will gradually renovate to gain more control of turf conditions.

Unrestricted use of golf carts will cease. Ways to keep carts in the cart paths will emerge. Ball location will also require some solution. If roughs go native, locating balls will be more difficult and more time consuming. Golfers aren't going to leave many $1.25 golf balls in the rough. Some provision will have to be made to make ball searching less desirable to the golfer. Changing rules to penalize slow play could have some effect, but poor golfers care more about the relatively expensive golf ball than they do their score.

It is imperative that government agencies stop subsidizing municipal courses so that the greens fee can rise to a level determined through competition by daily fee courses. If subsidies don't stop, many daily fee courses will be unable to cover rising maintenance costs and return a profit to shareholders too. Perhaps the pressure for zero-base budgeting will stop such frivolous and unfair subsidizing.

Use of secondary treated effluent water for golf courses and sod farms will increase. Management will have to provide monitoring devices, to hire someone who can understand water organisms and content, and to work closely with water management districts. The technology of irrigation with effluent will be developed under Federal support and private research.

Effluent water will play a significant role in reclamation in the 1980's. Although native plant species will be used, irrigation will be needed to speed up natural establishment. Coal development will happen in a big way with reclamation right behind. The scale of the projects may limit contracting to large, equipped companies. The key that will prevent any local farmer with a seed drill to underbid will be understanding of native plant species and their proper establishment. Only well-trained horticulturists with knowledge of native plant material should direct large-scale reclamation efforts. The Department of Interior must stand firm on specifications for reclamation under the guidance of experts in native plant material. Coal companies won't like picky specs on native plants and they will resist them until the Department of Interior shows its insistence and determination to reject anything less. Once the point is made, however, they will make the necessary commitment to secure the coal and restore the land as quickly as possible.

As farms turn into housing developments, man will bring with him his tree, ornamental, and lawn standards. These standards will be higher as well in the new decade. Occupations involving the care of man's green world will grow. But higher standards will mean a need for increased knowledge and sophistication by Green Industry professionals.

With or without Federal support through Urban Forestry programs, greater attention will be paid to the urban environment. The arborist, the landscape contractor, the lawn care specialist, the nurseryman, and the extension agent will be dealing with a broader variety of plant materials. Factors such as irrigation and soil pH will be considered by property owners. Plant and forget will be reserved for remote, unpopulated areas. The population centers will become urban plant showcases, each with a special natural feeling to ease man's anxiety under more crowded conditions. Man has learned from his concrete jungle mistakes and will strive to avoid their recurrence. The Green Industry businessman will show him how .

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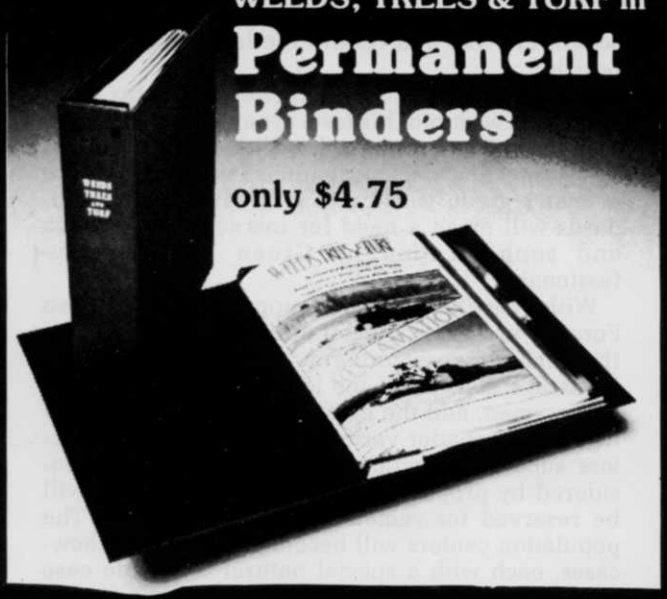

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PRUNING PROGRAMS REQUIRE ACCURATE SCHEDULE, MANAGEMENT

By Harleigh Kemmerer, Superintendent of Grounds, University of Houston at Clear Lake City, TX

Most facilities have living plants and anytime there are plants there is also a need for pruning. It is the responsibility of the grounds supervisor to develop a program which will provide proper pruning and at the right time for each of the different types of plants growing at his facility.

Instructions on how and when to prune are given in numerous publications. Scheduling work crews to perform pruning when it needs to be done and without interfering with other necessary chores must be done by the supervisor after a thorough analysis of the plant population. Type, number, age, general condition and locations of the plants are used as aids for the development of a pruning program.

A well-managed pruning program involves scheduling personnel, equipment, tools and handling of brush. It is also imperative the manager and crew know the names and identities of the various plants on the grounds. It is impossible to know when or how to prune if no one knows what is being pruned.

Postponing pruning until there is a slacking of other grounds work or until the foreman is looking for something for the crew to do to keep busy causes problems. The delay can turn a potentially hazardous situation into a real danger. It may be responsible for damage to property or injury to people or animals.

Allowing plants to grow completely out of bounds means that extensive cutting must be done to get the plant back to an acceptable size. The need for excessive pruning will often ruin the appearance of the plant until new growth covers bare spots. Sometimes, the plant's attractiveness is permanently ruined and it must be removed.

The best approach for pruning is to schedule it on a frequent basis. This prevents the need to remove a lot of wood and also allows the pruning crew to see the plants on a regular basis. Potential problems can be corrected before a hazard develops.

Scheduling on a calendar basis using the dates when pruning was done the preceding year is not completely valid because weather conditions modify blooming dates and when the flush of growth occurs. However, the dates when pruning is done should be recorded. They can serve as a reminder of when pruning needs to be done. Exact dates can be scheduled according to the growth pattern of the current year.

Winter months are a favorite time for pruning. The timing is fine for some plants, but winter pruning will remove buds from spring flowering shrubs. Also, it is difficult to find dead wood on plants in the winter.

The type of pruning to be done also influences the timing and scheduling. Pruning is normally done for the following reasons:

1. At the time of transplanting. Removing some of the top compensates for roots lost in transplanting. It helps the plant survive.
2. To remove dead, broken and diseased branches.
3. To keep the plant in bounds. Keep trees out of wires and shrubs from growing over sidewalks or windows.
4. For safety, to prevent plants from interfering with the view of stop signs and other regulatory and guidance signs. Also to prevent obstruction of the view at intersections and other hazardous areas.
5. To develop or maintain an espalier, topiary or other particular shape.
6. For rejuvenation. Old woody canes on shrubs often don't produce much flowering wood. Pruning some of the canes to the ground initiates new vigorous growth and doesn't harm the shape of the plants.

Pruning that involves the use of power equipment must be scheduled to avoid interference with classes, conferences and other activities being conducted at the facility. Schedules of some events are known well in advance. Problems with event scheduling may require doing the work on an overtime basis to avoid conflict. Emergency work must be done on an immediate basis regardless of the conflict. Noise and disturbance can be kept to a minimum if only the pruning to eliminate the danger is done with the final clearing and brush pickup deferred until the conflicting event is over.

A good time to inspect for pruning needs is after a rain.

Pruning to clear areas for painters, electricians, and other crafts is often on an emergency basis. However, when routine work is involved the building maintenance supervisor should inform the grounds supervisor of his requirements when his yearly work schedule is developed. This will enable the grounds supervisor to schedule the special pruning with his regular pruning activity.

If practical, all pruning needs within an area should be scheduled at the same time to avoid return trips and to simplify clean up.

The overall pruning schedule has to include all of the special considerations plus the regular pruning.

Inspections will reveal pruning needs also. A good time to inspect is immediately after a rain. Tree branches are at their lowest and thus any need for pruning along roads, parking lots, and other traffic ways is readily apparent. Shrubs also are spread by the weight of water. Checking them while they are wet will indicate where pruning is needed to clear walks, background plantings and other features.

Continues on page 36

Pruning *from page 35*

Assigning personnel to do the job of pruning isn't necessary if the work is done by outside forces. Usually, much of the pruning can and should be done by the grounds crew. All of it can be done if the organization includes a tree crew.

You should not assign just anyone to prune. It is best to select a person with an interest in plants and who has shown he respects pruning techniques. Handing each member of the crew a pruner and telling him to start pruning creates confusion and makes it impossible for supervisors to direct their efforts to those that have the best likelihood of learning. In all situations, including the use of a commercial pruning firm, it is best for the supervisor to prune one plant as a model and to set the standard.

In-house pruning requires the purchase of chain saws and other pruning tools. Normally the cost is justified even if the tools are only used on an occasional basis. The greatest problem is inventory control. Pruning tools and small hand shears seem to disappear. Having a pruning crew reduces the need for many tools and gives control. The crew member should be responsible for his tools. The crew leader can make sure the crew members don't misplace or abuse the tools by using them for other tasks such as cutting wire and string. Tools should be stored in a way to protect cutting edges and to prevent theft.

Brush disposal is the last aspect of managing pruning activities. Chipping is the best procedure because it reduces volume, permits recycling of debris, and eliminates the need for a large brush pile. However, chippers are expensive and a truck with a high enclosed body is needed to transport the chipper and to hold the chips. Institutions with a pruning crew usually have a truck assigned to the crew. Facilities that don't generate enough brush should devise a portable solid side arrangement for a truck body. The sides can be removed when the truck is used for other purposes.

Good management with a chipper involves chipping brush where it is produced. Although noisy, the operation on location eliminates double handling, avoids untangling brush piles for chipping, and gets the brush chipped before it gets dry (dry wood dulls chipper blades).

If a brush pile is used, it should be located in an area that is relatively safe from fire hazards or unlikely to become a community dumping ground.

The storage area for chips also needs to be secure because chips have become a valuable commodity. Any excess chips can be made available to members of the institution. Chip service will make them more conscious of the grounds activities. Participating in the benefits derived from the grounds program will help increase the respect that people have for the program and will also be beneficial in getting approval of budget requests. **WTT**

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VEGETATION MANAGEMENT

By **Roger Funk, Ph. D.,** Vice President Research and Development,
The Davey Tree Expert Company

The following discussion on fertilizer absorption and burn is in response to the many requests for fundamental information in these areas.

How are fertilizers absorbed?

All fertilizers, whether organic or inorganic, will eventually form soluble salts that separate in water to release the nutrient ions. Ions are atoms or groups of atoms that carry either positive or negative charges and *are the only form of nutrients that can be absorbed by plant roots.*

The process of nutrient absorption is not clearly understood, but it is believed that the positively or negatively charged ions are attracted to an opposite charge within the root membrane. Through this attraction the nutrient ion is passed across the membrane into the root cells. As long as the fertilizer remains in an uncharged state, it cannot be absorbed.

How are nutrient ions formed?

Inorganic fertilizers are composed of positive and negative ions that separate when the fertilizers dissolve in water. For example, when ammonium nitrate (NH_4NO_3) dissolves in water it releases the positively charged ammonium ion (NH_4^+) and the negatively charged nitrate ion (NO_3^-).

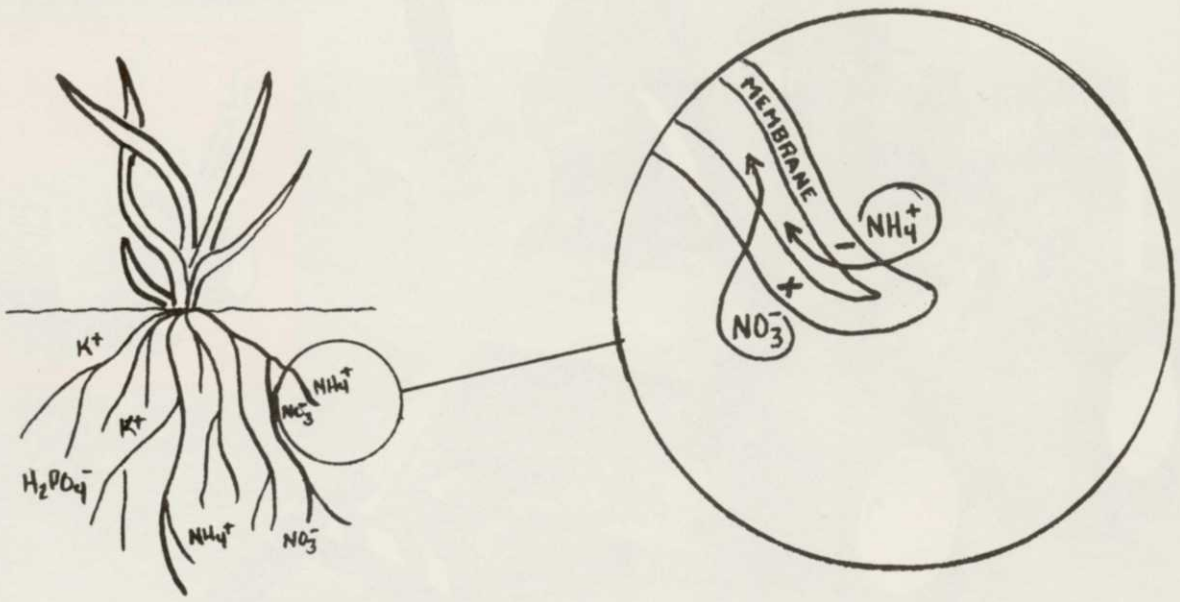
Fertilizer	Formula		Available Forms
ammonium nitrate	NH_4NO_3	*water*	$NH_4^+ + NO_3^-$
superphosphate	$Ca(H_2PO_4)_2$	*water*	$Ca^{++} + 2\,H_2PO_4^-$
potassium sulfate	K_2SO_4	*water*	$2\,K^+ + SO_4^=$

Organic fertilizers release the same nutrient ions found in inorganic fertilizers but the process is generally slower. Most organic fertilizers must be decomposed by soil microorganisms before the nutrients become available.

Fertilizer	Formula		Available Forms
organic nitrogen (segment)	-C-N-C-NH_2	*water microbial decomposition*	NH_4^+ NO_3^-

In general, inorganic fertilizers are considered quick-release and organic fertilizers slow-release because of the release rate of the nutrient ions. Inorganic fertilizers that are coated with an insoluble or slowly soluble material can also be considered slow-release since the coating slows down the release of the ions by inhibiting the penetration of water. The concept of slow-release is usually applied only to nitrogen fertilizers since, of the primary fertilizers, only nitrogen in the form of nitrate is rapidly leached from the root zone.

Continues on page 40



Ions of the dissolved fertilizer are absorbed through the root membrane when attracted to an opposite charge inside the root. A high concentration of salts in the soil around the roots can reverse the flow of elements, depriving the plant of nutrients and water.

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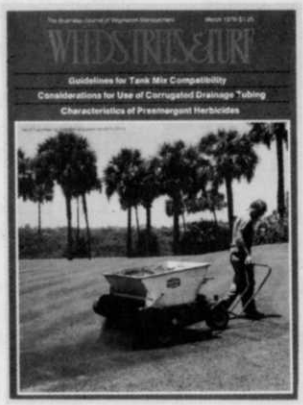

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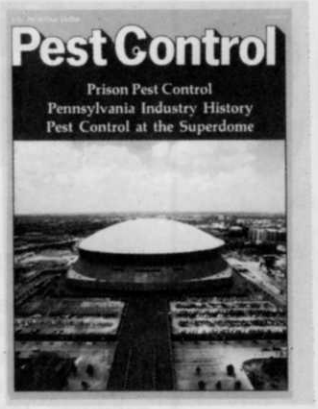

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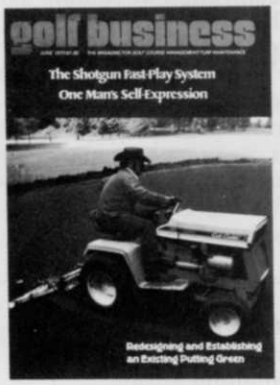

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How does a fertilizer burn?

The same soluble salts or nutrient ions that are absorbed by plant roots can also cause a type of physiological drought called "burn." Water is absorbed by plants through a process known as osmosis. As long as the root cells maintain a higher concentration of soluble salts than does the water in the surrounding soil, the root cells will absorb water. If, however, too much fertilizer is applied at one time and the salts in the soil water become too concentrated, the absorption of water is reduced. When the level of soluble salts in the soil is very high, water may actually be pulled out of the root tissue into the surrounding soil solution.

The degree to which a fertilizer increases the salt concentration of soil solution is measured by the Salt Index — the higher the salt index, the more rapidly the fertilizer releases soluble salts and the higher the "burn potential."

Fertilizer	Formula	Salt Index
potassium chloride	KC1	116.3
ammonium nitrate	NH_4NO_3	104.7
sodium nitrate	$NaNO_3$	100
urea	H_2NCONH_2	75.4
ammonium sulfate	$(NH_4)_2SO_4$	69
potassium sulfate	K_2SO_4	46
diammonium phosphate	$(NH_4)_2HPO_4$	34.2
natural organic		3.5

How does soil pH affect nutrient absorption?

The term pH expresses the relative concentration of hydrogen (H^+) and hydroxyl (OH^-) ions in solution. A pH of 7 means the hydrogen and hydroxyl ions are equal and the solution is said to be neutral. A pH below 7 means the solution contains more hydrogen ions than hydroxyl ions, and is said to be acid. Similarly, a pH above 7 means the solution contains more hydroxyl ions and is alkaline.

The presence of an element in the soil is no guarantee that it is in a *soluble* form available for absorption. The concentration of hydrogen and associated ions affects soil reaction and the formation of soluble and insoluble compounds. *All nutrients must be soluble to be available for root absorption.* Each nutrient has a pH range of maximum availability simply because within this range it forms a large proportion of soluble compounds.

Plant species differ in their response to the soil acidity because of differences in nutrient requirements. For most plants, the conditions of nutrient availability, without toxic amounts, are best near pH 6.5. **WTT**

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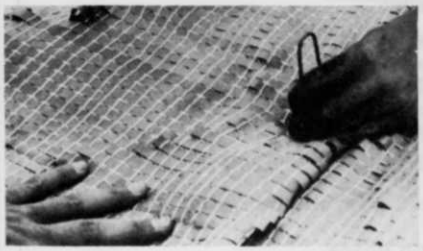

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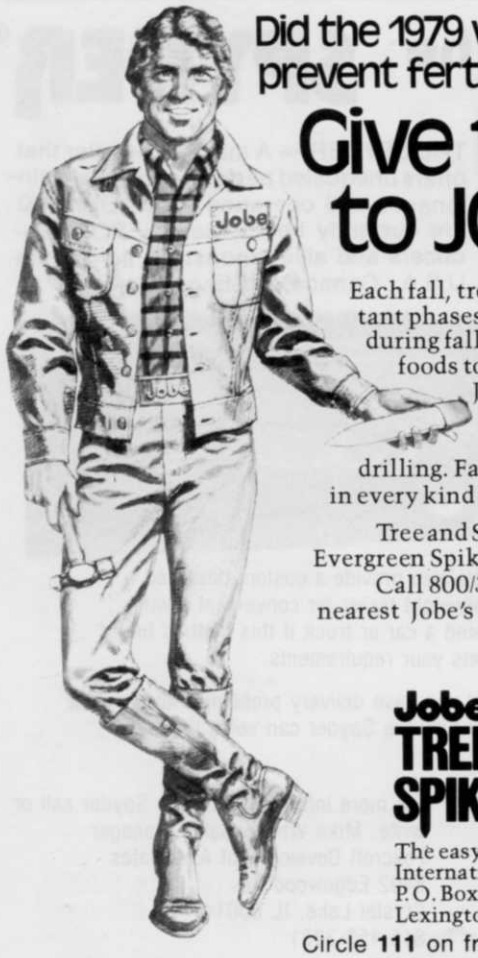

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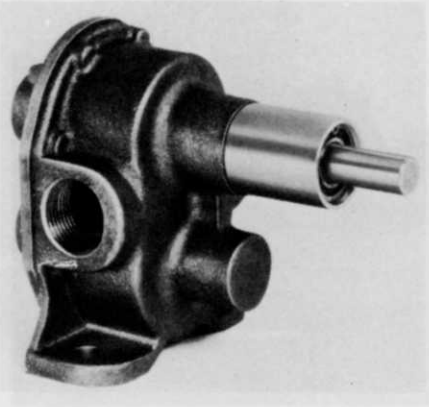

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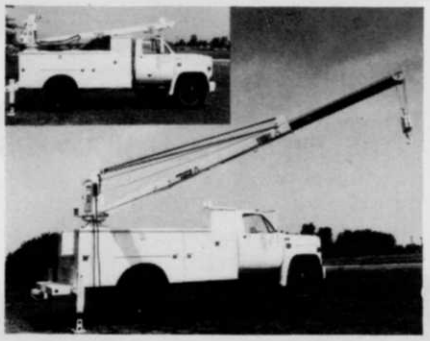

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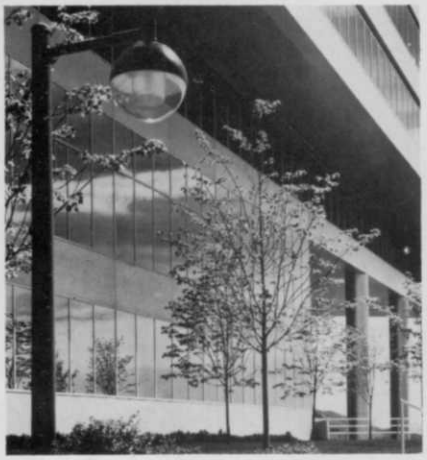

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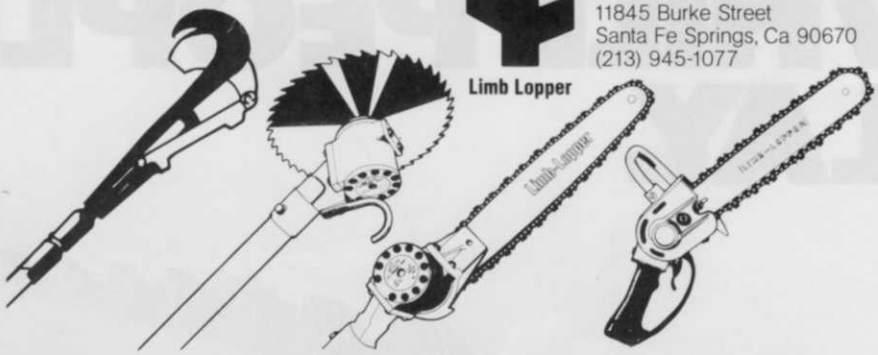

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HI-RANGERS AERIAL BASKETS 65', 57', 53'. Skyworkers aerial baskets 65', 50', 40'. Vermeer stump cutter 1560, 6. Vermeer tree spade 66, TS 44. Asplundh bucket and brush chippers. Bean sprayer, 9 ton trailer. Parkway Tree Service, 12026 W. Cherry, Wauwatosa, Wisc. 53226. 414 257-1555.

STUMP CUTTER, VERMEER 1560, very good condition. Sheehan Tree Service, 1944 Ridge Road, West, Rochester, N.Y. 14626. 716 225-1850.

NUNES SOD HARVESTER with pick-up head, completely gone over, excellent condition and 2 Finneyfrock pull type sod cutter. 2 1978 Ryan cutter 15". 301 442-2220.

FOR SALE OR TRADE: 800 gallon Finn hydro seeder, skid mounted, $4,200.00. 1500 gallon Bowie hydro seeder, $9,800.00. 1973 Ford 3500 tractor, loader, 3 point hitch, like new, $5,500.00 1971 HD4 crawler, 1 yard loader, $8,500.00. Kurt Kluznik, 968 Mentor Ave., Painesville, Ohio 44077. 216 951-5295.

FOR SALE: Nunes turf harvester. 18" x 72" rolls. Purchased new August 1, 1978. Current model. With mower attachment. $24,000.00. Call 503 422-7204.

BRUSH CHIPPERS, used Asplundhs, Hydro-Axs and bucket trucks. Lease or for sale. Large inventory available. Call or write P. C. Gould Sales Company, Plains Road, Essex, Conn. 06426. 203 767-1636.

BOMFORD FLAIL auto-mower, extra parts, cutting head. Very reasonable as no longer needed. Port., Oregon, 641-5813 or 292-6562.

FOR SALE: Bean sprayer, 600 gallon capacity, stainless steel tank, low hours, like new with extras. 30 gallons per minute. $4,500.00 Charles Joerres, 899 Indian Town Rd., Fall River, Mass. 617 678-4815.

JACOBSON GREENS KING 62 and Verti cutters, 3rd year. Jacobson 70 trimmer, 2nd year. These units never been on grinder. 5 gang Spartan Toro, good condition. 3 gang Spartan Toro, new. Foley sharpener, hoist and attachments. Back lapper. Toro Greensmaster. Equipment off 9 hole course. Carl Foley, Manager, Bridgeport Golf Course, Star Route, Bridgeport, Nebraska 69336. 308 262-1537.

1 "ROBARK" netsetter, like new condition, 40 acres of use. 1 year old. $8,-500.00. Call Mr. Silk 206 825-5266 collect or write Barron Industries, P.O. Box I, Sumner, WA 98390.

FOR SALE: Finn hydro seeder. Like new, 0275 hours, 1560 gallon size. Price $8,-000.00. Northwest Nursery Company, Inc., Box 934, Valley City, North Dakota 58072.

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FOR SALE: 5-800 gallon Tuflex spray tanks, 2 years old in excellent condition. 513 761-4100.

SOD CUTTER 16' Ryan overhauled, good condition, $500.00. John Deere trencher 3' width, 18' depth, new carbide chain, $350.00. Holland one row transplanter, 3 point hitch mount, $250.00. Power rake 24', runs, $75.00. Heisel Landscape Nursery, Bozeman, Montana. 406 587-4858.

FOR SALE: Used Nunes sod harvester. Diesel International tractor, good condition. Trade in on new Princeton. $8,-500.00. Call Rodger Osborne, 614 837-9096, Princeton Mfg. Company, Canal Winchester, Ohio 43110.

USED PUMPS, John Bean 30 & 35; Frank Wheatley P200A; Complete spray truck 1963 F600, 1000 gal. tank, pump, reel; All good condition. Portland, Oregon 503 297-4010 or 646-3281.

TREE TRUCKS

(22) 1970-72 GMC 5500 series with crew cabs and dump chip boxes. Running condition but all need minor repairs. $2,300 to $2,900.

(15) 1967-70 GMC tree trucks (same as above) All need major repairs. Value lies in crew cab and chip box, $1,200 to $1,600.

(5) 1972 Int. 1800 series 14' grain, trash or fire wood body dump, $5,000 each.

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TWO LAWN SPRAYING SERVICES in central Illinois 35 miles apart. Over $110,-000 volume, 2 Ford F600 1200 gallon trucks, 1 F600 Ford flatbed, 1 F100 Ford, 2 300 gallon Bean sprayers, 1 200 gallon Bean sprayer, 2000 & 3000 gallon storage tanks on flatbed, 1500 gallon fiberglass storage tanks, misc. equipment. Will sell together or individually. Write Box 235, Weeds Trees & Turf, Box 6951, Cleveland, Ohio 44101.

9 YEAR TREE, spray & trim business in Roslyn Heights, N.Y. Most respected in area. Large repeat business at top dollar. Opportunity for expansion unlimited. Equipment; accounts. Write or call Quality Tree Service, P.O. Box 1321, Roslyn Heights, N.Y. 11577. 516 484-1799.

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CROP-GROWING SUPPLIES in central east. Profitable. Family size. Potential in commercail lawn, tree and turf area. Write: Box 234, Weeds Trees & Turf, Box 6951, Cleveland, Ohio 44101.

WANTED TO BUY

USED BRUSH CHIPPER and stump cutter in good condition. Contact Ray Hallford, Tree Doctor, P.O. Box 30121, Dallas, Texas 75230. 214 690-1945.

SEEDS

SOD QUALITY Seeds: Adelphi, Glade, Cheri, Nugget, Merion, Fylking, Majestic, Baron & Touchdown bluegrasses, also fine fescues. Manhattan ryegrass. Custom mixing available. Michigan State Seed, Grand Ledge, Michigan 48837. Phone 517 627-2164.

LAWN SEED. Wholesale. Full line of top quality grasses. Improved bluegrass varieties, fine fescues and fine bladed ryegrasses. We specialize in custom mixing. Oliger Seed Company, 2705 Wingate Avenue, Akron, Ohio 44114. Call collect 216 753-2259.

TURF GRASS SEEDS. All improved varieties suitable for Canadian conditions, custom mixtures, and Prill-On coated seeds. Oseco, Inc., P.O. Box 219, Brampton, Ontario, Canada, L6V 2L2. Phone 416 846-5080.

HELP WANTED

GOLF COURSE TURF PROFESSIONALS: An opportunity to sell Pro Turf© products. ProTurf Division of O.M. Scott & Sons, the nation's leading manufacturer and marketer of professional turf products, has openings for Technical Representatives in several territories. The Tech Reps selected will call on golf course superintendents, requiring a knowledge of turf management and an understanding of these professionals' needs. Applicant should have a BS degree or equivalent in one of the agronomic sciences. Excellent starting salary plus bonus, automobile, and a comprehensive benefits program at no cost to employees go along with these positions. Send resume in confidence to Dick Stahl, Director of ProTurf, O.M. Scott & Sons, Marysville, Ohio 43040. An equal opportunity employer.

POSITION AVAILABLE coordinating sod growing and sales on two farms; some travel; southern U.S.; background in horticulture or agronomy. Salary plus bonus. Please send complete resume to Box 231, Weeds, Trees and Turf, Box 6951, Cleveland, Ohio 44101.

MAINTENANCE FOREMAN: Landscape contracting firm looking for a 2 or 4 year horticulture or landscape gradulate, or individual with equivalent experience to handle spraying and small landscape jobs. Working position for mature, responsible, person who is willing to produce. For more complete details, call or write to: Garden Gate Landscaping, Inc., Attn: Jim Speipel, 821 Norwood Road, Silver Spring, MD 20904. 301 924-4131, office, 301 848-6490, Home.

SELL LAWNSPRAY DEALERSHIPS — Join one of America's oldest and fastest growing natural and organic lawnspray companies as a company-trained representative earning top commissions. Degree and agronomic experience preferred, but not absolutely necessary. Unlimited potential and free training for the right candidates across the U.S. Send resume in confidence, or call Tom Hughes, V.P. Marketing, Agro-Chem, Inc., 11150 W. Addison, Franklin Park, Illinois 60131, 312 455-6900.

ASSISTANT MANAGER — Excellent opportunity for financial advancement for settled person age 28 years or older with sod, landscaping, and farming experience to assist in operation and management of sod farm near Bowie, Maryland. Forward resume to Fairwood Turf Farm, Inc., 12307 Annapolis Road, Glenn Dale, Maryland 20769.

PARK AND RECREATION DIRECTOR: Looking for an enthusiastic, experienced person to direct a multi-facet park and recreation program. Salary range $12,840-$16,200. Fringe benefits. Forward resume to Park and Recreation Board, attention: City Clerk, P.O. Box 438, City of Maryville, Missouri 64468. Equal opportunity affirmative action employer.

BAREFOOT GRASS LAWN SERVICE of Denver, Colorado will be accepting applications for Lawn Technicians in December. Positions will be available, beginning February 1st 1980. Send resume by January 5th, 1980 to: 2045 S. Valentia St., No. 18, Denver, CO 80231.

WANTED: General manager for turf and agriculture farm operation. Experienced in warm climate grasses, also cotton and alfalfa preferred. Excellent salary and benefits. Live and enjoy the Valley of the Sun. Please send resume and inquiries to: Arizona Turf Farms, P.O. Box 861, Chandler, AZ 85224.

ASSISTANT SOD FARM MANAGER — Must be mature, familiar with all phases of sod farming. Good salary & benefits. Experience 5 years necessary. Send resume to Valley Green Sod Farm, Lawn & Garden Center, 1996 Sedivy Lane, Rapid City, South Dakota 57701. 605 348-6999.

LANDSCAPE SALES: Salaried position in sales for person with selling, design, mathematics and landscaping skills with commercial landscape contractor. EOE. Send resume to: Chapel Valley Nursery Company, 3275 Jennings Chapel Road, Woodbine, Maryland 21797.

CHEMICAL LAWN CARE company needs working foreman with at least three years experience in turf management including supervision, sales, customer and employee relations. Must have mechanical background. 214 690-1900. Lawn Doctor, P.O. Box 30121, Dallas, TX 75230.

TREE CREW LEADERS and Tree Trimmers, qualified, to do utility line clearing needed in our Mountain States Division and other areas. Crew leader applicants must have good record of successful crew operation. Send letter showing qualifications and references with address and phone number to: Personnel Director, Wright Tree Service, Inc., P.O. Box 1718, Des Moines, Iowa 50306. An equal opportunity employer.

EXPERIENCED SALESPERSON. Products — grass seed, sod, allied lines. Territory-Northern Ohio, Western Pennsylvania. Salary plus expenses and bonus. Send resume to Green Valley Turf Farms, Inc., P.O. 163, Canfield, Ohio 44406.

BUSINESS OPPORTUNITIES

WANT TO BUY OR SELL a golf course? Exclusively golf course transactions and appraisals. McKay Golf & Country Club Properties, 15553 N. East St., Lansing, Michigan 48906. Phone 517 484-7726.

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MISCELLANEOUS

KELWAY SOIL pH TESTER, used by professionals everywhere. Direct reading, longlasting, portable, lightweight, no power source. Model HB-2 reads moisture too. Available through local distributors or contact Kel Instruments Co., Inc., Dept. W, P.O. Box 1869, Clifton, N.J. 07015. 201 471-3954.

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Cash deal.

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EVENTS

The current issue of WEEDS TREES & TURF carries meeting dates beginning with the following month. To insure that your event is included, please forward it, 90 days in advance, to: WEEDS TREES & TURF Events, 9800 Detroit Ave., Cleveland, OH 44102.

50th Annual Michigan Turfgrass Conference, Michigan State University, E. Lansing, MI, **Jan. 15-16.** Contact: Thomas Smith, 323 Agriculture Hall, Michigan State University, E. Lansing, MI 48824.

Southern Weed Science Society Annual Meeting, Arlington Hotel, Hot Springs, AR, **Jan. 15-17.** Contact: Jerry Weber, North Carolina State University, Weed Science Center, 3123 Ligon St., Raleigh, NC 27607.

Mid-Am Trade Show, Rosemont, IL, **Jan. 20-23.** Contact: Mid-Am Trade Show, 4300-L Lincoln Ave., Rolling Meadows, IL 60008, 312-359-8160.

Ohio Nursery Short Course and Trade Show, Sheraton-Columbus Hotel and Veterans Memorial, Columbus, OH, **Jan. 20-24.**

Landscape Ontario Annual Congress, Sheraton Centre Hotel, Toronto, Ontario, Canada, **Jan. 22-24.** Contact: Robert Cheesman, Landscape Ontario, 103-3034 Palstan Rd., Mississauga, Ontario, Canada, L4Y 2Z6, 416-276-6177.

Connecticut Tree Protective Association 558th Annual Meeting, Sheraton Park Plaza Hotel, New Haven, CT, **Jan. 23.** Contact Connecticut Tree Protective Association, P.O. Box 352, West Haven, CT 06516.

Basic Short Course in Horticulture— Brentwood Theater, Veterans Administration, West Los Angeles, CA, **Jan. 22, 29; Feb. 5, 12, and 19;** Diamond Bar Country Club, Diamond Bar, CA, **Jan. 23, 30; Feb. 6, 13, and 20;** UC Cooperative Extension Office, San Bernardino, CA, **Jan. 24, 31; Feb. 7, 14, and 21.** Contact Ed McNeill, Registration Coordinator, Horticultural Education Fund, 1000 Concha St., Altadena, CA 91001, 213-798-1715.

Annual Turf & Landscape Conference, Tappan Zee Inn, Mountain View Ave., Nyack, NY, **Jan. 30.** Contact: Frank Claps, 136 Laurel Ave., Larchmont, NY 10538, 914-834-6846.

16th Turfgrass and Environmental Landscape Exposition, San Mateo County Fairgrounds, San Mateo, CA, **Jan. 30-31.** Contact Emory Hunter, Chairman, NCTC, P.O. Box 268, Lafayette, CA 94549.

Virginia Turfgrass Conference, Fort Magruder Inn, Williamsburg, VA, **Jan. 30-31.** Contact: J.F. Shoulders, Ext. Specialist-Turf, College of Agriculture and Life Sciences, Virginia Polytechnic and State University, Blacksburg, VA 24061.

ALCA Annual Meeting and Trade Exhibit, Town and Country Hotel, San Diego, CA, **Feb. 3-8.** Contact: Associated Landscape Contractors of America, 1750 Old Meadow Rd., McLean, VA 22102, 703-821-8611.

United States Golf Association Regional Turf Conferences, **Feb. 4** Myrtle Beach Hilton, Myrtle Bech, SC; **Feb. 6** Quality Inn, Cypress Gardens, FL; **Mar. 3** Phoenix Country Club, Phoenix, AZ; **Mar. 6** Holiday Inn West, Billings, MT; **Mar. 7** Broadmoor Golf Club, Seattle, WA; **Mar. 11** Lakeside Country Club, Houston, TX; **Mar. 13** James River Country Club, Virginia Beach, VA; **Mar. 18** Westchester Country Club, Rye, NY; **Mar. 20** Oakmont Country Club, Pittsburgh, PA. Contact USGA, Far Hills, NJ 07931, 201/766-7822.

Colorado Nurserymen's Association Nursery Conference, Denver Merchandise Mart, 451 East 58th Ave., Denver, CO, **Feb. 4-6.** Contact Cary G. Hall, Executive Secretary, Colorado Nurserymen's Association, 10775 North 65th St., Longmont, Co 80501.

Wastewater Irrigation Course, Denver, CO, **Feb. 5-7.** Contact: The Irrigation Association, 13975 Connecticut Ave., Silver Spring, MD, 20906, 301-871-8188.

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May 1979/$1 25

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Quality, by our standard, is something which goes a lot further than making tools. To Stanley, it means: a full line of tree trimmers for every job; the best warranty in the business; complete parts backup; and distributors to help you anywhere in the country. It's also the efficiency, safety and dependability of hydraulic power. We don't trim on anything so that you're able to do your trimming faster. Stanley Hydraulic Tools: 3810 S.E. Naef Road, Milwaukie, Oregon 97222. Phone (503) 659-5660. Telex 360771. Write or call.

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the bronson concern.

283 The Water Tower
Portland, Oregon 97201
222-3546 area 503

21 August 1979

Mr. Dick Gore
National Advertising Sales Manager
Harvest Publishing Company
#312, Maple Center One Building
3019 Maple Drive
Atlanta, Georgia 30305

Dear Dick:

I'm writing to express our appreciation to your publication, Weeds, Trees & Turf, for its truly outstanding performance for our client Stanley Hydraulic Tools.

Effective 15 February of this year, our 1/3 page B&W ad for Stanley's line of tree-trimming tools had drawn more inquiries (771 in eleven months) than any other of the company's ads in other publications. In fact, the next closest number of inquiries were drawn by a 4-color spread (528)!

Needless to say, we're impressed, and grateful, and we can anticipate Weeds, Trees & Turf becoming an ever-stronger part of Stanley Hydraulic's total promotional program.

Best regards,

Ingrid Louiselle

Ingrid Louiselle
Media Director

IL/hs
cc: Mr. Bob Mierow

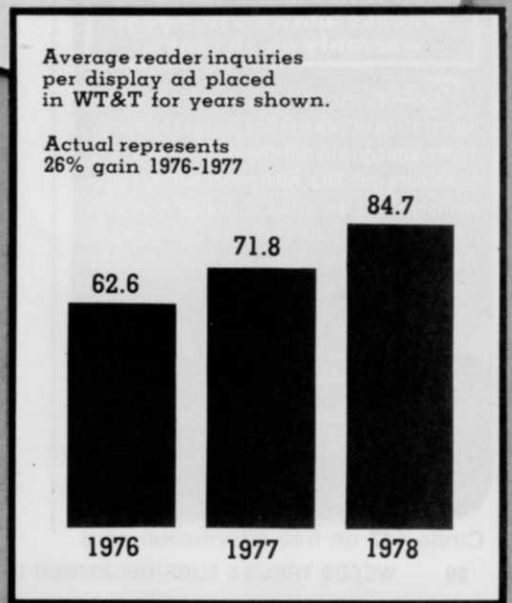
771 inquiries
in eleven months.

This Stanley one-third page in Weeds Trees & Turf pulled "more inquiries than any other publication . . . Even more than a four-color spread elsewhere"

—Ingrid Louiselle, the bronson concern

Buyers who track advertising performance know Weeds Trees & Turf magazine is highly productive . . . and we think productivity is a mighty important testimonial for media decisions.

Come grow with us. WEEDS TREES & TURF



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WHEN THERE'S NO SUBSTITUTE FOR THE BEST!

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Post Office Box 13143
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Events *from page 48*

Super Turf Seminar, Holiday Inn, West Palm Beach, FL, **Feb. 8-9.** Contact Eldon Mahan, Box 311, Bethany, OK 73008, 405/787-8034.

Landscape/Garden Center Management Clinic, The Galt House, Louisville, KY, **Feb. 10-13.** Contact Harry C. Kiely, Administrator, Garden Centers of America, 230 Southern Bldg., Washington, DC 20005, 202/737-4060.

Horticultural Trade Meeting And Show, Holiday Inn, North Randall, OH, **Feb. 12-13.** Contact Fred K. Buscher, Area Extension Agent, Horticulture, Area Extension Center, O.A.R.D.C., Wooster, OH 44691, 216/262-8176.

WT&T

ADVERTISERS

Agro-Chem Inc. 24
Bowie Industries....42
Brouwer Turf Equip. Ltd. 23
Cellin Mfg. Co. 21
Cushman/OMC Lincoln....13
John Deere & Co., Inc....2,3
Great Lakes Biochemical....5
Ditch Witch, Div. Charles Machine Works....37
Foxcroft Dev. Corp. 41
Howard Price Turf Equip. 10
International Spike 42
Jacobsen Mfg. Co. 16,17
Kawasaki 31
Lakeshore Supply ....cover 3
Limb Lopper 43
Lofts Pedigreed Seed Co....cover 4
Mathews Co. 6
McDowell....48
Mid-Am Trade Show 40
Monsanto Chemical Co. 15
Princeton Mfg. Co. 14
Rhone Poulenc 8,9
Ryan/OMC Lincoln....4
Solo 43
SPIC....7
Torco 36
Tuflex 50
Union Carbide....44
Wisconsin Marine 40

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Ron Giffen, Vice President of National Sales

I've told you about our Lescosan (Betasan*), the best selling pre-emergence crabgrass control on the market. You've proven its effectiveness. I'm here to tell you now that Lakeshore Equipment & Supply produces an equally effective line of sulfur-coated fertilizers.

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Call Lakeshore today and ask about Lescosan, Sulfur-Coated Fertilizers and our other turfgrass supplies. Ask for Barb — she'll have one of our turf specialists give you the full story and work out a complete program tailored to meet your specific needs.

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